

REPORT, RETURNS AND STATISTICS
OF THE
INLAND REVENUES

OF THE
DOMINION OF CANADA

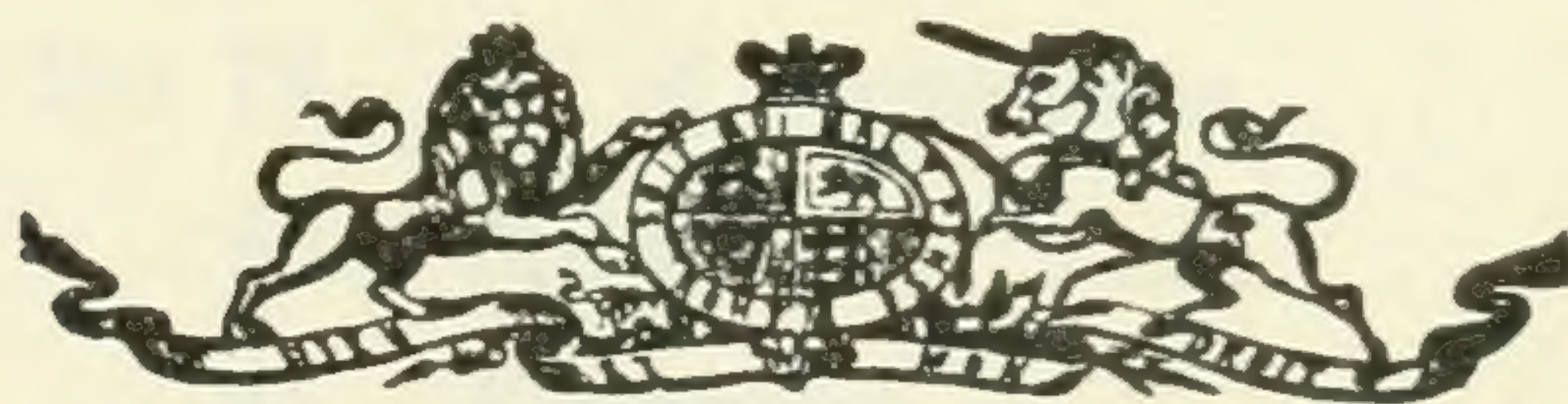
FOR THE FISCAL YEAR ENDED JUNE 30

1902

PART III

ADULTERATION OF FOOD

PRINTED BY ORDER OF PARLIAMENT



OTTAWA

PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST
EXCELLENT MAJESTY

1902

INLAND REVENUES

DOMINION OF CANADA

1902

PART II

ADULTERATION OF FOOD



PRINTED BY THE QUEEN'S PRINTER
OTTAWA
1902

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REPORT

OF THE

DEPUTY MINISTER OF INLAND REVENUE.

INSPECTION OF FOODS, DRUGS AND FERTILIZERS.

To the Honourable M. E. BERNIER,
Minister of Inland Revenue.

SIR,—I have the honour herewith to submit the reports of the official analysts of the Dominion for the fiscal year ended June 30, 1902.

The following is a summary statement of the whole number of samples analysed by them :—

Description of Samples.	Genuine.	Adult- erated.	Doubtful.	Total.
Tea.....	59	.....	.....	59
Milk for preservatives	173	3	0	176
" ordinary constituents	116	30	36	182
Drugs, &c. for arsenic.....	252	13	29	294
Coffee.....	34	24	1	59
Cocoa and chocolate.....	15	1	0	16
Fertilizers.....	67	10	8	85
Cheese.....	12	0	0	12
Total.....	728	81	74	883

I have the honour to be, sir,
Your obedient servant,
W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, October 18, 1902.

REPORT

DEPUTY MINISTER OF ISLAND AFFAIRS

REPORT OF THE DEPUTY MINISTER OF ISLAND AFFAIRS

FOR THE YEAR 1911

PRESENTED TO THE HOUSE OF REPRESENTATIVES

IN CONJUNCTION WITH THE REPORT OF THE SECRETARY OF THE INTERIOR

FOR THE YEAR 1911

BY THE DEPUTY MINISTER OF ISLAND AFFAIRS

U.S. GOVERNMENT

DEPARTMENT OF THE INTERIOR

OFFICE OF THE DEPUTY MINISTER

NAME	AGE	SEX	RELATION	EDUCATION	PROFESSION	RESIDENCE
JOHN A. BROWN	35	M	H	High School	Farmer	Wash. D.C.
MARY A. BROWN	32	F	W	High School	Homemaker	Wash. D.C.
JOHN C. BROWN	28	M	B	High School	Farmer	Wash. D.C.
MARY C. BROWN	25	F	W	High School	Homemaker	Wash. D.C.
JOHN D. BROWN	22	M	B	High School	Farmer	Wash. D.C.
MARY D. BROWN	20	F	W	High School	Homemaker	Wash. D.C.
JOHN E. BROWN	18	M	B	High School	Farmer	Wash. D.C.
MARY E. BROWN	16	F	W	High School	Homemaker	Wash. D.C.
JOHN F. BROWN	15	M	B	High School	Farmer	Wash. D.C.
MARY F. BROWN	14	F	W	High School	Homemaker	Wash. D.C.
JOHN G. BROWN	13	M	B	High School	Farmer	Wash. D.C.
MARY G. BROWN	12	F	W	High School	Homemaker	Wash. D.C.
JOHN H. BROWN	11	M	B	High School	Farmer	Wash. D.C.
MARY H. BROWN	10	F	W	High School	Homemaker	Wash. D.C.
JOHN I. BROWN	9	M	B	High School	Farmer	Wash. D.C.
MARY I. BROWN	8	F	W	High School	Homemaker	Wash. D.C.
JOHN J. BROWN	7	M	B	High School	Farmer	Wash. D.C.
MARY J. BROWN	6	F	W	High School	Homemaker	Wash. D.C.
JOHN K. BROWN	5	M	B	High School	Farmer	Wash. D.C.
MARY K. BROWN	4	F	W	High School	Homemaker	Wash. D.C.
JOHN L. BROWN	3	M	B	High School	Farmer	Wash. D.C.
MARY L. BROWN	2	F	W	High School	Homemaker	Wash. D.C.
JOHN M. BROWN	1	M	B	High School	Farmer	Wash. D.C.
MARY M. BROWN	0	F	W	High School	Homemaker	Wash. D.C.

U.S. GOVERNMENT

OFFICE OF THE DEPUTY MINISTER

DEPARTMENT OF THE INTERIOR

WASHINGTON, D.C.

U.S. GOVERNMENT

OFFICE OF THE DEPUTY MINISTER

REPORT OF CHIEF ANALYST.

LABORATORY OF THE INLAND REVENUE DEPARTMENT,
317 QUEEN STREET,

OTTAWA, October 25, 1902.

W. J. GERALD, ESQ.,

Deputy Minister of Inland Revenue.

SIR.—In accordance with your request of 22nd September last, I beg to supply the following statement as regards the examination of samples in this Branch during the last three years.

	During the fiscal year ended		
	30 June, 1900.	30 June, 1901.	30 June, 1902.
1. Number of samples collected by the food inspectors for examination	895	885	883
2. Number of these samples examined by the public analysts	756	881	883
3. Number of these samples examined in the Laboratory here	181	243	270
4. Number of samples examined at the Laboratory here, duplicates of which were not analysed by the public analysts	730	802	600
This number however includes the following:—			
Samples of beer	44	25	32
Samples of vinegar	360	413	346
Samples examined for other Departments,—			
Marine and Fisheries	1	3	15
Public Works	0	0	3
Militia and Defence	2	0	3
Indian Affairs	0	0	6
Agriculture	0	0	15
Police Branches	1	1	1
Interior	0	0	2
Trade and Commerce	0	2	0

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

2-3 EDWARD VII., A. 1903

REPORTS OF PUBLIC ANALYSTS.

LABORATORY OF THE OFFICIAL ANALYST FOR

NOVA SCOTIA AND PRINCE EDWARD ISLAND,

66 BEDFORD ROW,

HALIFAX, N.S., July 8, 1902.

The Deputy Minister of Inland Revenue,
Ottawa.

SIR,—I have the honour to submit my annual report on the samples of food, &c., analysed by me during the year ending June 30, 1902, as follows :

Sample.	Genuine.	Adult- erated.	Doubtful.	Total.
Tea.....	8	.....	.....	8
Milk for preservatives.....	22	2	.....	24
" ordinary constituents	20	3	4	27
Drugs.....	31	9	.....	40
Coffee.....	.....	8	.....	8
Fertilizers.....	8	2	.....	10
Total.....	89	24	4	117

I have the honour to be, sir,

Your obedient servant,

MAYNARD BOWMAN.

ANNUAL REPORT of Samples analysed in the Quebec Laboratory, from July 1, 1901 to June 30, 1902,

Kind of Samples.	Month in which analysed.	Number of Samples.	Genuine.	Adulter- ated.	Doubtful.	Sold as Compound
	1901.					
Tea.....	July.....	8	8	.....	.....	.....
Milk for preservatives.....	August.....	24	24	.....	.....	.....
Milk, ordinary analysis.....	September..	24	18	2	4	.....
Drugs, etc., for Arsenic.....	October.....	40	29	.....	11	.....
Coffee.....	November..	8	5	3	.....	.....
Fertilizers.....	March.....	10	10	.....	.....	.....
Total.....	.....	114	94	5	15	.....

DR. M. FLSET,

District Analyst.

SESSIONAL PAPER No. 14

BUREAU DE L'ANALYSTE PUBLIC,

ST-HYACINTHE, QUÉ., 26 juillet 1902.

Monsieur le sous-ministre,
Département du Revenu de l'Intérieur,
Ottawa.

MONSIEUR,—J'ai l'avantage de vous présenter le résumé du travail qui m'a été adressé par le département durant l'année fiscale finissant le 30 juin 1902.

Le tableau suivant renferme mes conclusions sur les 165 échantillons examinés.

Nature des échantillons.	Purs.	Adultérés.	Douteux.	Total.	Remarques.
Thé.....	9	9	Ce qui fait une moyenne d'adulté- ration de 7·3 p.c.
Lait (pour préservatif) ..	27	.....	.....	27
Lait (analyse générale) ..	17	4	6	27	
Produits Pharmaceutiques divers (pour Arsenic).....	45	.....	.....	45
Café.....	5	3	1	9	
Cacaos et Chocolats	8	1	.....	9
Engrais	9	2	.....	11
Fromages.....	12	.....	.....	12
Total	132	10	7	149	

THÉ.

Sur 9 échantillons, aucun n'était adultéré, mais quelques-uns renfermaient beaucoup de débris de thé.

LAIT.

Il est à remarquer que sur les 27 échantillons examinés au point de vue des préservatifs, aucun n'en contenait; je pense qu'il serait prudent de ne pas abaisser les "types" pour le gras et les solides totaux, car la spéculation aidant, bientôt les consommateurs n'auraient plus pour aliment que "de l'eau blanchie par le lait." Sur 27 échantillons examinés (analyse générale) 4 étaient adultérés et 6 douteux, comme étant un peu en dessous des types admis.

PRODUITS PHARMACEUTIQUES, DIVERS.

Examinés pour l'arsenic, aucun ne contenait de ce poison; c'est une amélioration sur les précédents examens, mais j'ai signalé à l'attention 1 échantillon de sulfate de fer contenant du sulfate de cuivre, sans doute accidentellement.

CAFÉ.

Sur 9 échantillons, 3 étaient adultérés, 2 par le "classique adultérant", la chicorée; 1 autre par une préparation de ce produit dépassant la quantité déclarée par le vendeur.

CACAOS ET CHOCOLATS.

Sur 9 échantillons, un seul était fraudé par de la farine de maïs.

ENGRAIS.

Sur 11 échantillons, 2 étaient en dessous de la garantie.

FROMAGES.

Sur 12 échantillons examinés, il n'y en avait aucun d'adultéré, mais en général le fromage canadien offre encore le défaut de ne pas être pressé progressivement et suffisamment, ce qui laisse dans sa pâte non homogène, ces veines d'un gris verdâtre dues aux champignons (Moisi).

J'ai l'honneur d'être, monsieur le sous-ministre,

Votre obéissant serviteur,

A. L. TOURCHOT.

(Translation.)

OFFICE OF THE PUBLIC ANALYST,
ST. HYACINTHE, QUE., July 26, 1902.

To the Deputy Minister,
Department of Inland Revenue,
Ottawa.

SIR,—I have the honour of presenting to you a resumé of the work which has been submitted to me by the department during the fiscal year ended June 30, 1902.
The following table contains my conclusions regarding the 149 samples examined :—

	Genuine.	Adul- terated.	Doubtful.	Total.
Tea.	9	..	..	9
Milk for preservatives.....	27	..	..	27
Milk for ordinary constituents	17	4	6	27
Drugs, &c., for arsenic.....	45	..	..	45
Coffee.....	5	3	1	9
Cocoas and chocolates.....	8	1	..	9
Fertilizers.....	9	2	..	11
Cheese	12	..	..	12
	132	10	7	149

TEA.

Of nine samples none were found adulterated, but some of them contained tea debris.

MILK.

It is to be remarked concerning the twenty-seven samples examined for preservatives, that none of them contained any. I am of opinion that it would not be prudent to lower the standards for fat and total solids, otherwise speculation would soon produce the result that consumers would not have more for aliment than ‘water coloured by milk’. Of twenty-seven samples, examined for the ordinary constituents, four were found adulterated and six doubtful.

DRUGS, &C., FOR ARSENIC.

Of the drugs and other substances examined for arsenic none contained any of this poison, but I call attention to the fact that one sample of sulphate of iron contained sulphate of copper, no doubt accidentally.

COFFEE.

Of nine samples three were adulterated ; two by the classical adulterant chicory, and one by a preparation of this product exceeding the quantity declared by the vendor.

SESSIONAL PAPER No. 14

COCOA AND CHOCOLATE.

Of nine samples only one was found adulterated, and that by the addition of maize flour.

FERTILIZERS.

Two of eleven samples were found below guarantee.

CHEESE.

Twelve samples were examined, and none found adulterated, but in general Canadian cheese still shows the defect of not being pressed gradually and sufficiently, which leaves in its mass veins of a greenish grey colour due to mushrooms (Moisi).

I have the honour to be, sir,

Your obedient servant,

A. L. TOURCHOT.

112 St. FRANÇOIS XAVIER STREET,

MONTREAL, June 30, 1902,

The Deputy Minister of Inland Revenue,
Ottawa.

SIR,—I have the honour to submit my report on the samples submitted to me since my appointment in November, 1901, to June, 30, 1902.

Ten samples of fertilizers have been analysed by me. Two of these contained over one per cent less than the guaranteed amount of one or more ingredient and were therefore returned as adulterated. The remaining eight samples were genuine.

I have the honour to be, sir,

Your obedient servant,

J. T. DONALD.

2-3 EDWARD VII., A. 1903

OTTAWA, July 14, 1902.

The Deputy Minister of Inland Revenue,
Ottawa,

SIR,—I have the honour to submit to you a statement of the work reported on by me during the fiscal year ending June 30, 1902.
During this period ninety-nine samples were submitted to me for analysis. Of these eight were found unadulterated, eight adulterated and four doubtful as may be seen from the following table:—

	Genuine.	Adulterated	Doubtful.	Total.
Tea	7			7
Milk for preservatives.....	21			21
Milk ordinary analysis..	11	6	4	21
Coffee ..	6	1		7
Fertilizers	8	1		9
Drugs, etc., for arsenic—				
Alum.....	2			2
Acetic acid ..	2			2
Ammonium chloride.....	2			2
Epsom salts.....	3			3
Sulphate of soda ..	4			4
Acid phosphoric dilute	2			2
Ammonium sulphate	2			2
Effervescent phosphate of soda.	4			4
Ferrous sulphate	3			3
Glucose syrup.....	2			2
Acid phosphate ..	2			2
Baking powder	6			6
Total....	87	8	4	99

I have the honour to be, sir,
Your obedient servant,
F. X. VALADE, M.D.

SCHOOL OF PRACTICAL SCIENCE,
TORONTO, July 12, 1902.

The Deputy Minister of Inland Revenue,
Ottawa.

SIR,—I have the honour to report the work done in my laboratory during the past year.
I have analysed during that time 112 samples, of which I reported 94 as genuine, 19 as doubtful and nine as adulterated.
Among the doubtful samples are classed fertilizers which were not registered according to the Act.
I append a tabular statement of my work.

I have the honour to be, sir,
Your obedient servant,
W. H. ELLIS.

TABLE showing work done in the Laboratory of the District Analyst at Toronto for the year 1901-2.

Samples.	Genuine.	Adulter- ated.	Doubtful.	Total.
Tea...	8	...	...	8
Milk for preservatives...	23	1	...	24
Milk for ordinary constituents	12	12	2	26
Drugs, &c., for arsenic...	31	3	2	36
Coffee...	5	3	...	8
Fertilizers	5	...	5	10
Total	84	19	9	112

OFFICE OF PUBLIC ANALYST,
LONDON, June 30, 1902.

The Deputy Minister of Inland Revenue,
Ottawa.

SIR,—I have the honour to present a tabulated statement of results of the analysis of samples submitted to me by the department during the past year :—

Samples.	Genuine.	Adulter- ated.	Doubtful.	Total.	Remarks.
Tea.....	7	.....	...	7	{ 21 of these samples were examined only for pre- servatives.
Milk for preservatives.....	21	.....	...	21	
Milk for ordinary constituents..	12	1	8	21	
Cocoa and chocolate.....	7	.....	...	7	These were examined only for arsenic, and while it was present in many cases the quantity was too small in my judgment to be termed an adulter- ation.
Chemicals (soda phosphate, &c.)..	35	.....	...	35	
Coffee.....	4	3	...	7	Two samples classed as adulterated were not re- gistered.
Fertilizers.....	6	3	...	9	
	92	7	8	107	

I have the honour to be, sir,
Your obedient servant,
FRANKLIN T. HARRISON.

282 ASSINIBOINE AVE.,
WINNIPEG, CANADA, July 10, 1902.

The Deputy Minister of Inland Revenue,
Ottawa.

SIR,—I beg to report the number of samples analysed for the department during the past year as follows :—

	Genuine.	Adulter- ated.	Doubtful.	Total.
Tea.....	6	.....	.....	6
Milk for preservatives.....	17	.....	.....	17
Milk for ordinary constituents.....	15	.....	3	18
Drugs, &c., for arsenic.....	25	.....	7	32
Coffee.....	6	.....	.....	6
Fertilizers.....	5	.....	3	8
	74	. . . . .	13	87

Your obedient servant,

EDGAR B. KENRICK,

SESSIONAL PAPER No. 14

LABORATORY OF THE OFFICIAL ANALYST FOR BRITISH COLUMBIA,
VICTORIA, June 30, 1902.

The Deputy Minister of Inland Revenue,
Ottawa.

SIR,—I have the honour to submit my annual report on the samples of food, &c., analysed by me during the year ending June 30, 1902, as follows :—

Samples.	Genuine.	Adulterated.	Doubtful.	Total.
Milk for preservatives.....	18	.....	.....	18
Milk (ordinary analysis).....	11	2	5	18
Tea.....	6	.....	None.	6
Coffee.....	3	3	"	6
Drugs, &c., for arsenic—				
Sulphate of iron.....	2	.....	"	2
Dried alum.....	1	.....	2	3
Phosphate of soda.....	1	.....	1	2
Chloride of ammonia.....	2	.....	.....	2
Baking powder.....	.....	1	5	6
Acetic acid.....	2	.....	.....	2
Sulphate of ammonia.....	1	.....	1	2
Glauber salts.....	3	.....	None.	3
Dilute phosphoric acid.....	2	.....	"	2
Epsom salts.....	3	.....	"	3
Effervescing phosphate soda.....	2	.....	"	2
Glucose.....	2	.....	"	2
Sulphite of soda.....	1	.....	"	1
Commercial fertilizers.....	8	.....	"	8
	68	6	14	88

I have the honour to be, sir,

Your obedient servant,

C. J. FAGAN.

APPENDIX A.—INSPECTION OF

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.		No. of Analyst's Certificate.	No. of Sample.	RESULT OF				
					Moisture.	Total aqueous extract by prolonged boiling.	Substances extracted by 10 minutes infusion.		
							Total.	Theine.	Tannin.
1901.	Official Analyst, M. Bowman, Halifax, N.S.				p. c.	p. c.	p. c.	p. c.	p. c.
Aug. 6.	Tea, green, Salada		12972	20054	.....	.....	31.76	2.28	10.85
" 6.	"		12973	20055	.....	.....	31.70	2.31	15.90
Oct. 3.	" green		17501	20068	.....	.....	30.12	2.38	11.42
" 4.	"		17502	20069	.....	.....	26.40	2.01	9.68
July 17.	" " Japan		12968	17790	.....	.....	30.34	2.64	12.79
" 17.	" " uncoloured, Japan		12969	17791	.....	.....	29.50	2.69	13.37
" 19.	" " green, Japan		12970	17792	.....	.....	30.74	2.24	13.18
" 22.	" " black, Salada		12971	17793	.....	.....	27.38	3.28	10.08
Official Analyst, Dr. M. Fiset, Quebec.									
" 12.	Tea, Japan		13821	19864	6.70	39.25	27.40	2.00	8.96
" 12.	"		13822	19865	6.66	40.40	30.40	2.26	9.13
" 12.	"		13823	19866	5.52	40.00	30.90	2.30	8.63
" 15.	"		13824	19867	4.64	42.40	32.85	2.36	11.78
" 15.	"		13825	19868	4.48	43.90	32.55	2.52	7.31
" 15.	"		13826	19869	5.84	35.00	28.00	1.84	5.81
" 16.	"		13827	19870	6.68	40.00	27.00	2.12	8.30
" 16.	" green, Ceylon, Salada		13828	19871	5.04	50.05	33.65	2.90	14.94
Official Analyst, A. L. Tournhot, St. Hyacinthe, P.Q.									
" 4.	Tea, Japan		2917	19855	3.50	63.75	30.25	2.86	13.62
" 4.	"		2918	19856	4.80	57.50	30.75	2.04	10.05
" 4.	"		2919	19857	5.30	56.25	21.50	1.28	9.30
" 10.	"		2920	19858	4.32	46.88	25.25	2.52	13.41
" 10.	"		2921	19859	5.28	43.75	25.00	2.30	11.30
" 11.	" Ceylon, green, Salada		2922	19860	4.04	53.74	24.85	2.72	12.97
" 17.	" Japan		2923	19861	5.14	53.75	26.50	1.20	13.73
" 17.	"		2924	19862	4.80	40.00	15.90	1.35	11.19
" 17.	"		2925	19863	6.94	65.02	22.50	1.29	9.68
Official Analyst, Dr. F. X. Valade, Ottawa.									
June 26.	Tea, Salada, Ceylon, green		14910	20868	.....	46.64	30.30	3.37	8.06
" 26.	" green, Salada		14911	20869	.....	38.83	29.10	3.04	8.12
" 26.	" Japan		14912	20870	.....	40.71	30.70	2.88	6.98
" 26.	"		14913	20871	.....	45.10	29.30	3.32	7.21
" 28.	" green, Ceylon		14914	20872	.....	49.83	32.90	3.34	9.69
" 28.	" Japan		14915	20873	.....	44.55	30.00	3.03	7.80
" 28.	"		14916	20874	.....	40.30	28.80	2.90	8.35
Official Analyst, Dr. W. H. Eilis, Toronto.									
July 19.	Tea, green, Ceylon		16111	20883	.....	44.00	35.50	1.90	17.21
" 19.	" Japan		16112	20884	.....	42.35	35.00	1.66	12.48
" 20.	"		16113	20885	.....	39.00	30.80	2.18	17.55
" 20.	"		16114	20886	.....	42.70	31.60	2.08	15.21
" 20.	" "Salada," Ceylon, green		16115	20887	.....	47.25	33.60	1.95	20.67
" 20.	" mixed		16116	20888	.....	43.75	31.40	1.78	18.72
" 20.	" Japan		16117	20889	.....	43.00	33.80	1.60	18.72
" 20.	"		16118	20890	.....	41.00	35.80	1.93	18.14

SESSIONAL PAPER No. 14

TEA—Tabulated Statement.

ANALYSIS.							Remarks by Analyst.	Name and Address of Vendor of Sample.
Ash.				Foreign Leaves.	Fading.			
Total.	Soluble in Water.	Soluble in Acid.	Sand.					
p. c.	p. c.	p. c.	p. c.					
4.94	2.97	.....		None.....	None.....	Genuine.....	E. W. Crease, Halifax, N.S.	
4.40	2.65	..		"	"	"	G. S. McPherson	"
6.22	3.36	..		"	"	"	Dimock Bros., Windsor, N.S.	
6.90	3.26	.....		" .....	" .....	" .....	A. P. Torrens	"
6.38	3.51	.....		" .....	" .....	" .....	Vanwart Bros., St. John, N.B.	
6.15	3.70	.....		" .....	" .....	" .....	W. A. Porter	"
6.07	3.44	.....		" .....	" .....	" .....	G. M. & A. A. Barker, St. John, N.B.	
5.07	3.04	.....		" .....	" .....	" .....	Phillips & Watson	"
6.12	4.04	.....	0.28	"	"	"	Porrier & Obran, Three Rivers.	
6.16	3.60	.....	0.68	"	"	"	J. M. Spenard	"
7.92	4.24	.....	1.36	"	"	"	A. J. Nadeau	"
6.48	4.48	..	0.36	"	"	"	W. Boissoneault	"
6.84	4.00	.....	0.80	"	"	"	J. B. Rousseau, Quebec.	
6.72	3.64	.....	0.92	"	"	"	J. P. Latulippe	"
6.56	3.32	.....	0.88	"	"	"	C. Dionne, Fraserville, Que.	
5.00	3.36	.....	0.28	"	"	"	H. E. Thivierge	"
6.26	3.44	2.13	0.69	"	"	"	Geo. Dixon, Huntingdon, P.Q.	
5.82	3.56	1.85	0.41	"	"	"	R. E. Kelly	"
5.80	3.02	2.02	0.76	"	"	"	A. L. Hurtubise, Montreal.	
6.21	3.64	1.87	0.70	"	"	"	H. J. Giles & Bros., Lachute, Que.	
5.26	3.10	1.74	0.42	"	"	"	Hugh Fraser, jr.	"
5.02	3.16	1.67	0.19	"	"	"	Godfroy Pilon, Montreal.	
5.79	3.09	2.17	1.53	"	"	"	L. Hannan, Danville, Que.	
6.61	3.22	2.06	0.33	"	"	"	Josh. Masson	"
5.90	2.88	2.62	0.40	"	"	"	H. Gerard, Montreal.	
4.95	2.90	.....		" .....	" .....	" .....	C. Esmonde, Ottawa.	
6.46	3.52	.....		" .....	" .....	" .....	"	"
6.22	3.68	.....		" .....	" .....	" .....	A. E. Cowan	"
6.54	3.63	.....		" .....	" .....	" .....	Bryson, Graham & Co., Ottawa.	
4.86	2.66	.....		" .....	" .....	" .....	A. Daron, Carleton Place.	
6.43	3.62	.....		" .....	" .....	" .....	Wm. M. Sumner	"
6.22	4.64	.....		" .....	" .....	" .....	Weir & Labron	"
5.87	2.45	0.40	.....	None.....	"	Unadulterated	W. E. Baker, Lindsay, Ont.	
6.20	2.65	0.55	..	"	"	"	P. J. Hurley	"
5.90	2.65	0.65	.....	" .....	" .....	" .....	W. Bradshaw, Peterboro, Ont.	
6.00	2.75	0.55	.....	" .....	" .....	" .....	J. H. Savigny	"
4.75	2.05	0.15	.....	" .....	" .....	" .....	H. T. Kidd	"
5.50	2.30	0.30	.....	" .....	" .....	" .....	R. Barrow, Toronto, Ont.	
5.90	2.50	0.40	.....	" .....	" .....	" .....	Geo. Messer	"
5.95	2.75	0.50	.....	" .....	" .....	" .....	R. May	"

APPENDIX A.—INSPECTION OF

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	RESULT OF				
				Moisture.	Total aqueous extract by prolonged boiling.	Substance extracted by 10 minutes infusion.		
						Total.	Theine.	Tannin.
1901.	<i>Official Analyst, F. T. Harrison, London.</i>				p.c.	p.c.	p.c.	p.c.
July 3..	Tea, Ceylon, black	14353	21901	.....	40·5	30·8	3·49	7·21
" 3..	mixed.	14354	21902	.....	40·5	28·0	3·31	5·20
" 4..	Ceylon.	14355	21903	.....	43·0	31·7	3·36	6·87
" 4..	" mixed.	14356	21904	.....	40·5	29·7	3·60	6·21
" 4..	" "	14357	21905	.....	45·7	32·0	3·60	7·04
" 4..	mixed.	14358	21906	.....	41·1	29·4	2·94	6·37
" 4..	Blue Ribbon.	14359	21907	.....	45·0	30·5	3·25	6·87
	<i>Official Analyst, E. B. Kenrick, Winnipeg.</i>							
July 4..	Tea, Japan.	17060	17338	...	36·51	29·32	2·33	8·92
" 4..	" "	17061	17339	...	34·11	26·52	1·97	8·35
" 4..	" "	17062	17340	...	31·03	26·42	1·95	8·38
" 4..	" "	17063	17341	...	31·00	25·60	2·11	8·12
" 4..	" "	17064	17342	.....	36·25	29·29	2·42	8·94
" 4..	Salada, green.	17065	17343	..	41·03	28·78	2·12	8·68
	<i>Official Analyst, Dr. C. J. Fagan, B.C.</i>							
July 18..	Tea, green.	16807	21587	.....	38·20	31·20	2·80	...
" 18..	" "	16808	21588	...	40·70	33·00	2·10	.....
" 18..	" "	16809	21589	.....	37·20	28·80	2·60	.....
" 18..	" "	16810	21590	.....	36·30	31·60	2·90	.....
" 19..	" "	16811	21591	.....	40·70	31·70	2·40	.....
" 19..	" "	16812	21592	...	36·20	27·80	2·20	.....

SESSIONAL PAPER No. 14

TEA—Tabulated Statement—*Concluded.*

ANALYSIS.						Remarks by Analyst.	Name and Address of Vendor of Sample.
Ash.				Foreign Leaves.	Facing.		
Total.	Soluble in Water.	Soluble in Acid.	Sand.				
p.c.	p.c.	p.c.	p.c.				
5.12	3.22	.....	.....	A few pre- sent un- identified.	None.	Unadulterated	C. A. Nairn, Goderich, Ont.
5.43	3.36	.....	.....	None.....	"	" ..	T. G. Tipling "
5.80	3.87	.....	.....	" .....	" .....	" ..	John Fisher, Stratford, Ont.
5.25	3.27	.....	.....	" .....	" .....	" ..	C. McIlhargey "
5.93	3.39	.....	.....	" .....	" .....	" ..	John Easton, Guelph, Ont.
5.94	3.61	.....	.....	" .....	Some of the tea in the mixture had facing.	" ..	Jackson & Son "
5.45	3.48	.....	.....	" .....	None.	" ..	G. W. Crawford, Brampton, Ont.
6.77	3.92	.....	.....	None. None.	Genuine		Thos. Hartley, Winnipeg.
6.55	3.37	.....	.....	" . "	" .....		Hardy & Buchanan, Winnipeg.
7.24	3.83	.....	.....	" . "	" .....		Jackson & Campbell, "
6.19	3.41	.....	.....	" . "	" .....		Nelson & Co. "
7.66	3.67	.....	.....	" . "	" .....		A. Macdonald "
5.27	3.39	.....	.....	" . "	" .....		W. B. Francis "
5.7	1.8	.....	.....	" . "	" .....		Dickson Importing Tea Co., Van- couver, B.C.
5.67	2.52	.....	.....	" . "	" .....		Vanir Grocery Co., Vancouver, B.C
6.28	2.73	.....	.....	" . "	" .....		H. T. N. Dorner & Co. "
5.35	2.50	.....	.....	" . "	" .....		H. H. Edgett & Co. "
6.62	2.92	.....	.....	" . "	" .....		Orient Tea Co. "
7.40	4.40	.....	.....	" . "	" .....		Colombo Tea Co. "

APPENDIX B.—INSPECTION OF MILK (for preservatives) Tabulated Statement.

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	RESULT OF ANALYSIS.				Remarks by Analyst.	Name and Address of Vendor of Sample.
			No. of Sample.	Sp. Gr. at 15° C.		Ash—Grams, in 100cc.		
				p. c.	p. c.			
1901.	Official Analyst, M. Bowman, Halifax.							
Sept. 9.	Milk	12956	20056	1.0299	0.73	Boron compounds absent; genuine and contains no preservatives.	Mrs. Coulstring, Halifax.	
" 9.	"	12957	20057	1.0307	0.72	Boron compounds present; adulterated.	J. Sutherland	
" 9.	"	12958	20058	1.0295	0.74	Boron compounds absent; genuine and contains no preservatives.	Mrs. Fahy	
" 9.	"	12959	20059	1.0313	0.73	"	J. P. Buckley	
" 9.	"	12960	20060	1.0275	0.74	Boron compounds present; adulterated	J. Power	
" 9.	"	12961	20061	1.0302	0.70	" absent; genuine and contains no preservatives	Walter Payne	
" 11.	"	12962	20062	1.0307	0.72	"	W. H. Snook, Truro, N.S.	
" 11.	"	12963	20063	1.0309	0.75	"	T. B. Smith	
" 11.	"	12964	20064	1.0330	0.83	"	J. F. Deforest	
" 12.	"	12965	20065	1.0317	0.72	"	E. A. Fraser, New Glasgow, N.S.	
" 12.	"	12966	20066	1.0315	0.76	"	D. C. McKay	
" 12.	"	12967	20067	1.0305	0.71	"	Fraser Bros.	
" 15.	"	12944	17794	1.0315	0.71	"	J. R. Veale, St. John, N.B.	
" 15.	"	12945	17795	1.0329	0.79	"	Dunlop & Noakes	
" 15.	"	12946	17796	1.0261	0.72	"	Pure Milk & Dairy Co., St. John, N.B.	
" 15.	"	12947	17797	1.0300	0.71	"	Timothy Desmond	
" 15.	"	12948	17798	1.0305	0.70	"	A. E. Trentowski	
" 15.	"	12949	17799	1.0307	0.69	"	Geo. Martin	
" 15.	"	12950	17800	1.0314	0.72	"	Powys & Bodkin, Fredericton, N.B.	
" 15.	"	12951	17801	1.0274	0.71	"	Isaac Peabody	
" 15.	"	12952	17802	1.0320	0.74	"	C. Kelly	
" 15.	"	12953	17803	1.0315	0.70	"	Cyrus Vanwart, Woodstock, N.B.	
" 15.	"	12954	17804	1.0317	0.74	"	A. D. Smith	
" 15.	"	12955	17805	1.0317	0.76	"	J. J. Bedell	
Aug. 7.	Milk	13829	19873	1.0317	0.67	Found no preservatives present; genuine.	J. B. Lacombe, Quebec.	
	Official Analyst Dr. M. Fiset, Quebec.							

APPENDIX B. INSPECTION OF MILK (for preservatives) Tabulated Statement Continued.

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	RESULT OF ANALYSES		Remarks by Analyst.	Name and Address of Vendor of Sample.
				Sp. Gr. at 15 C.	Ash—Grams in 100cc.		
1901.	Official Analyst, A. L. Trenchot, St. Hyacinthe.			p. c.	p. c.		
Aug. 22.	Milk	2949	21034	1.0304	0.61	Preservatives, none ; genuine	H. Diotte, Que.
" 22.	"	2950	21035	1.0296	0.63	"	D. Lavallée "
" 22.	"	2951	21036	1.0314	0.66	"	R. Latraverse "
" 22.	"	2952	21037	1.0316	0.70	"	Dr. Prevost "
	Official Analyst, Dr. F. X. Valade, Ottawa.						
Aug. 6.	Milk	14917	20901	1.0304	0.65	Preservatives by the Blyth process ; white in 12 hours ; genuine.	James Sorly, Ottawa.
" 6.	"	14918	20902	1.0322	0.62	"	Ottawa Dairy Co., Ottawa.
" 6.	"	14919	20903	1.9298	0.66	"	E. Honeywell "
" 6.	"	14920	20904	1.0306	0.65	"	W. L. Scott "
" 6.	"	14921	20905	1.0323	0.54	"	G. F. Benedict "
" 6.	"	14922	20906	1.0320	0.67	"	Win. Gorman, Bros. "
" 6.	"	14923	20907	1.0326	0.72	"	John Frith "
" 6.	"	14924	20908	1.0319	0.57	"	Maple Leaf Dairy "
" 6.	"	14925	20909	1.0307	0.68	"	Robt. Magee "
" 2.	"	14926	20910	1.0324	0.63	"	W. C. Gardiner, Kingston.
" 2.	"	14927	20911	1.0316	0.70	"	John Gillespie "
" 2.	"	14928	20912	1.0296	0.62	"	McGrane Bros. "
" 2.	"	14929	20913	1.0334	0.71	"	J. E. Wilders "
" 2.	"	14930	20914	1.0320	0.70	"	J. P. H. Ferris "
" 2.	"	14931	20915	1.0325	0.74	"	Oak Point Farm "
" 2.	"	14932	20916	1.0316	0.74	"	Robt. Rosevear "
" 1.	"	14933	20917	1.0294	0.73	"	Booth Bros., Brockville.
" 1.	"	14934	20918	1.0318	0.57	"	J. Morrison "
" 1.	"	14935	20919	1.0317	0.55	"	N. J. Crippin "
" 1.	"	14936	20920	1.0324	0.66	"	H. B. Wright "
" 1.	"	14937	20921	1.0299	0.64	"	Grand Central Hotel, Brockville.
	Official Analyst, F. T. Harrison, London.						

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Aug. 19.	Milk.	14360	21908	1-0322	0-76	Preservatives none ; not adulterated.	H. Kerby, Stratford, Ont.
" 19.	"	14361	21909	1-0306	0-74	"	J. L. Linklater, Stratford, Ont.
" 19.	"	14362	21910		0-72	"	A. J. Clark
" 19.	"	14363	21911	1-0305	0-68	"	Wm. McKim
" 20.	"	14364	21912	1-0299	0-66	"	A. Howard, London, Ont.
" 20.	"	14365	21913	1-0300	0-73	"	W. J. Walker
" 20.	"	14366	21914	1-0297	0-63	"	Sage Dairy Co.
" 20.	"	14367	21915	1-0305	0-66	"	Sanitary Dairy Co.
" 20.	"	14368	21916	1-0316	0-68	"	W. W. Wilkinson
" 20.	"	14369	21917	1-0301	0-64	"	Sanitary Dairy Co.
" 21.	"	14370	21918	1-0312	0-67	"	S. Skelly, St. Thomas, Ont.
" 21.	"	14371	21919	1-0322	0-66	"	H. Dunsford
" 21.	"	14372	21920	1-0311	0-66	"	F. Carr
" 21.	"	14373	21921	1-0317	0-70	"	T. Rackey
" 22.	"	14374	21922	1-0327	0-69	"	A. A. McCahey, Chatham, Ont.
" 22.	"	14375	21923	1-0313	0-72	"	E. Main
" 22.	"	14376	21924	1-0320	0-71	"	A. Cameron
" 23.	"	14377	21925	1-0320	0-75	"	A. S. Skelly, Windsor, Ont.
" 23.	"	14378	21926	1-0310	0-71	"	R. Nicholls
" 23.	"	14379	21927	1-0311	0-70	"	C. Cook
" 23.	"	14380	21928	1-0257	0-55	"	D. G. Parient
<i>Official Analyst, Dr. W. H. Ellis, Toronto.</i>							
Aug. 28.	Milk.	16119	21929	1-0315	0-72	Preservatives, none ; unadulterated.	A. Forsyth, Toronto.
" 28.	"	16121	21930		0-68	"	H. R. Renolds, Toronto.
" 28.	"	16122	21931		0-67	"	D. Fleming
" 28.	"	16123	21932		0-75	"	J. Fletcher
" 28.	"	16124	21933	1-028	0-65	"	A. Arnold
" 28.	"	16125	21934		0-79	"	A. Dundas
" 28.	"	16126	21935		0-70	"	Price & Sons
" 28.	"	16127	21936	1-0305	0-73	"	City Dairy
" 30.	"	16128	21937	1-031	0-75	"	N. Wright, Orangeville, Ont.
" 30.	"	16129	21938	1-031	0-75	"	Henry Lavery
" 30.	"	16130	21939	1-032	0-72	"	A. McKinnon
Sept. 1.	"	16131	21941	1-032	0-74	"	F. Smith, Barrie, Ont.
" 4.	"	16132	21942	1-0325	0-77	"	S. Dymont
" 4.	"	16133	21943	1-0320	0-75	"	Wm. Caldwell
" 4.	"	16134	21944	1-0310	0-71	"	Mrs. Guilfoil
" 4.	"	16135	21945	1-0325	0-83	"	Chas. Lloyd
" 6.	"	16136	21946	1-0320	0-77	"	Thos. Weyer, Orillia, Ont.
" 6.	"	16137	21947	1-032	0-72	"	D. J. Dunn
" 6.	"	16138	21948	1-0335	0-68	Borates present ; mixed with borax.	Thos. Hughes
" 6.	"	16139	21949	1-0325	0-83	Preservatives, none ; unadulterated.	Mrs. D. Donaldson
" 6.	"	16140	21950	1-0320	0-77	"	B. R. Kean
" 6.	"	16141	21951	1-0320	0-76	" borates present ; adulterated by admixture with borax.	Chas. Brennan
" 6.	"	16142	21952	1-032	0-76	None	J. R. Ditchburn, Gravenhurst, Ont.
" 6.	"	16143	21953	1-0320	0-72	"	Jas. Passmore

APPENDIX B. INSPECTION OF MILK (for preservatives) Tabulated Statement—Concluded.

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.		Remarks by Analyst.	Name and Address of Vendor of Sample.
				Sp. Grav. at 14 C.	Ash (Titr. per 100 cc.)		
1901.							
Official Analyst, E. B. Kenrick, Winnipeg.							
Sept. 23.	Milk	17066	17314	1.0332	0.70	Free from preservatives.	N. Corbell, St. Boniface, Man.
" 23.	"	17067	17315	1.0315	0.69	"	P. Scanson, Winnipeg, Man.
" 23.	"	17068	17346	1.0345	0.72	"	Guay & Son, St. Boniface, Man.
" 23.	"	17069	17347	1.0338	0.75	"	J. G. Dalmon, Winnipeg, Man.
" 23.	"	17070	17348	1.0341	0.71	"	S. Slowson "
" 23.	"	17071	17349	1.0340	0.69	"	J. Hutchinson "
" 24.	"	17072	17350	1.0283	0.67	"	J. Balderston "
" 24.	"	17073	17351	1.0313	0.69	"	Ottawa Dairy "
" 24.	"	17074	17352	1.0313	0.71	"	R. H. Dickson "
" 24.	"	17075	17353	1.0314	0.71	"	H. N. Craig "
" 24.	"	17076	17354	1.0300	0.72	"	G. Einarson "
" 24.	"	17077	17355	1.0305	0.68	"	Dominion Dairy "
" 24.	"	17078	17356	1.0318	0.69	"	Norwood Dairy "
" 25.	"	17079	17357	1.0280	0.68	"	R. L. Barber "
" 25.	"	17080	17358	1.0305	0.70	"	A. Kirk "
" 26.	"	17082	17359	1.0300	0.68	"	W. McLean, Morden, Man.
" 26.	"	17083	17360	1.0328	0.72	"	M. Connors "
Official Analyst, Dr. C. J. Fagan, B.C.							
Aug. 23.	Milk	16996	21593		0.61	No preservatives; genuine	C. H. Brown, Vancouver, B.C.
" 23.	"	16995	21594		0.53	"	S. Garvin "
" 23.	"	16993	21595		0.63	"	F. Worster "
" 23.	"	16994	21596		0.63	"	J. G. Kirkwood "
" 23.	"	16990	21597		0.70	"	D. Beare "
" 23.	"	16992	21598		0.64	"	W. Clark "
" 23.	"	16989	21599		0.50	"	Valley Dairy Co. "
" 23.	"	16991	21600		0.53	"	Eligh & Metcalfe "
" 23.	"	16997	21601		0.55	"	F. Ellison "
" 28.	"	16998	21603	1.031	0.60	"	Buhant & Booth, New Westminster, B.C.
" 28.	"	16999	21604	1.030	0.55	"	J. E. Murphy "

"	28.	"	.....	17000	21605	1.030	0.52	"	.....	F. W. Smith	"
"	28.	"	.....	16801	21606	1.030	0.59	"	.....	A. Douglas	"
"	28.	"	.....	16802	21607	1.029	0.54	"	.....	J. McMartin	"
"	28.	"	.....	16803	21608	1.031	0.58	"	.....	J. Jones, Vancouver, B.C.	"
"	28.	"	.....	16804	21609	1.029	0.54	"	.....	J. Armstrong	"
"	28.	"	.....	16805	21610	1.031	0.59	"	.....	J. Wolfor	"
"	28.	"	.....	16806	21611	1.029	0.62	"	.....	C. H. Brown	"

APPENDIX C. INSPECTION OF DRUGS AND OTHER ARTICLES FOR ARSENIC.—Tabulated Statement.

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	RESULT OF ANALYSIS.		Remarks by Analyst.	Name and Address of Vendor of Sample.
				Arsenious Acid.			
1901.	<i>Official Analyst, M. Bowman, Halifax, N.S.</i>						
Nov	7 Glaubers salts.....	17503	20085	None			M. D. Logan, Halifax, N.S.
"	7 Glucose.....	17504	20086	"			Moir, Son & Co. "
"	7 Epsom salts.....	17505	20087	"			Buckley Bros. "
"	7 Sulphite of soda.....	17506	20088	"			G. H. Colwell "
"	7 Glaubers salts.....	17507	20089	"			H. Taylor "
"	8 Sulphate of iron.....	17508	20090	"			Hattie & Mylius "
"	8 Chloride of ammonium.....	17509	20091	"			" "
"	8 Sulphate of iron.....	17510	20092	"			J. R. Rawley "
"	8 Phosphate of soda.....	17511	20093	15.66 grain per oz.		Adulterated	" "
"	8 Alum.....	17512	20094	15.66 "			Simson Bros. "
"	11 Glaubers salts.....	17513	20095	None			A. A. Thompson "
"	11 Acid phosphate.....	17514	20096	"			Simson Bros. "
"	15 Epsom salts.....	17515	20097	"			W. H. Stevens, Dartmouth, N.S.
"	15 Acetic acid.....	17516	20098	"			" "
"	15 Acid phosphoric dilute.....	17517	20099	"			Brown Bros. & Co., Halifax.
"	15 Alum.....	17518	20100	6.66 of a grain per oz.		Adulterated	" "
"	18 Acid phosphate.....	17519	20101	4.00 "		"	Hattie & Mylius "
"	18 Eff. phosphate of soda.....	17520	20102	15.66 "			" "
"	18 Sulphate of ammonia.....	17521	20103	15.66 "			Brown & Webb "
"	18 Baking powder, 'New Process'.....	17522	20104	None			E. S. Tracey "
"	18 " 'English Cream'.....	17523	20105	"			E. W. Crease "
"	18 " 'Fast Line'.....	17524	20106	7.16 of a grain per oz.		Adulterated	H. W. Wentzell & Co "
"	18 " 'English Cook School'..	17525	17818	15.66 "			Vanwart Bros., St. John, N.B.
"	18 " 'Cream'.....	17526	17819	None			McPherson Bros. "
Dec.	1 ".....	17527	17820	"			P. Nase & Son "
"	2 Sulphate of iron.....	17528	17821	"			G. A. Moore "
"	2 Phosphate of soda.....	17529	17822	"			Chipman, Smith & Co "
"	2 Sulphite of soda.....	17530	17823	"			Silas McDiarmid "
"	4 Eff. phosphate of soda.....	17531	17824	"			T. B. Barker & Son "
"	5 Glucose.....	17532	17825	"			The White Candy Co. "

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"	6	Chloride of ammonium.....	17533	17826	$\frac{1}{500}$ of a grain per oz	G. W. Hobin
"	16	Phosphate of soda.....	17534	17827	None	C. A. Burchill, Fredericton, N.B.
"	16	Acid phosphate.....	17535	17828	$\frac{1}{500}$ of a grain per oz	.....	Hunt & McDonald "
"	16	Sulphate of ammonia.....	17536	17829	None	.....	J. M. Wiley "
"	18	Sulphite soda.....	17537	17830	"	.....	Baird Drug Co., Woodstock, N.B.
"	18	Acetic acid (strong).....	17538	17831	"	.....	Garden Bros. "
"	18	Alum.....	17539	17832	"	.....	Connell's Drug Co. "
"	21	Phosphoric acid dilute.....	17540	17833	"	.....	F. Smith, St. Stephen, N.B.
"	21	Epsom salts.....	17541	17834	"	.....	F. Waterson "
"	21	".....	17542	17835	"	.....	Johnston & Johnston "
<i>Official Analyst, Dr. M. Fiset, Quebec.</i>							
Oct.	3	Phosphate of soda.....	13877	21101	0.0	.....	T. R. Goulden, Montreal.
"	3	Alum.....	13878	21102	Faint trace.....	.....	" "
"	3	Glaubers salts.....	13879	21103	0.0	.....	" "
"	3	Epsom salts.....	13880	21104	0.0	.....	" "
"	3	Alum.....	13881	21105	Faint trace.....	.....	H. Lanctot "
"	3	Sulphate of iron.....	13882	21106	0.0	.....	" "
"	3	Phosphate of soda.....	13883	21107	0.0	.....	J. L. Lyons "
"	3	Alum.....	13884	21108	0.0	.....	" "
"	3	Phosphoric acid dilute.....	13885	21109	0.0	.....	" "
"	3	Epsom salts.....	13886	21110	0.0	.....	" "
"	4	Glaubers salts.....	13887	21111	0.0	.....	Dr. Sabourin, St. Johns, P.Q.
"	4	Phosphoric acid dilute.....	13888	21112	0.0	.....	" "
"	4	Chloride of ammonium.....	13889	21113	0.0	.....	" "
"	4	Sulphate of iron.....	13890	21114	0.0	.....	Wright & Co. "
"	4	Phosphate of soda.....	13891	21115	0.0	.....	" "
"	4	Sulphite of soda.....	13892	21116	0.0	.....	" "
"	7	Acetic acid.....	13893	21117	0.0	.....	V. Giroux, Quebec.
"	7	Eff. phosphate of soda.....	13894	21118	0.0	.....	" "
"	7	Epsom salts.....	13895	21119	0.0	.....	" "
"	7	Glaubers salts.....	13896	21120	0.0	.....	" "
"	7	Chloride of ammonium.....	13897	21121	0.0	.....	W. Brunet & Co., Quebec.
"	7	Sulphate of ammonia.....	13898	21122	0.0	.....	" "
"	7	Sulphite of soda.....	13899	21123	0.0	.....	" "
"	7	Acetic acid.....	13900	21124	0.0	.....	" "
"	7	Sulphate of iron.....	13901	21125	0.0	.....	J. Laroche, St. Valier.
"	7	Acid phosphate.....	13902	21126	0.0	.....	" "
"	8	Baking powder 'Kitchen Queen'.....	13903	21127	Faint trace.....	.....	E. Renillard, Montmagny, P.Q.
"	8	" " 'Cooks' Pride'.....	13904	21128	"	.....	J. P. Lésperance "
"	8	" " ".....	13905	21129	"	.....	Labrecque et frère, Lévis, P.Q.
"	8	" " ".....	13906	21130	"	.....	G. Carrier "
"	8	Sulphite of soda.....	13907	21131	0.0	.....	O. J. Dion "
"	8	Sulphate of ammonia.....	13908	21132	0.0	.....	J. E. Livernois, Quebec.
"	8	Acid phosphate.....	13909	21133	Traces, about .001 % (arsenious acid) or less	.....	"
"	8	Eff. phosphate of soda.....	13910	21134	0.0	W. Rogers "
"	8	Glucose.....	13911	21135	Faint trace.....	"

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"	31	Glaubers salts	17701	21162	"	"	"	R. W. Williams	"
"	31	Sulphite of soda	17702	21163	"	"	"	"	"
"	31	Phosphoric acid dilute	17703	21164	"	"	"	"	"
"	31	Epsom salts	17704	21165	"	"	"	"	"
"	31	Glucose	17705	21166	"	"	"	L. Hoerner	"
"	31	Eff. phosphate of soda	17706	21167	"	"	"	"	"
"	31	Acetic acid	17707	21168	"	"	"	J. R. McBain, Sherbrooke, Que.	"
Nov.	4	Eff. phosphate of soda	17708	21169	"	"	"	W. H. Griffiths	"
"	4	Phosphoric acid dilute	17709	21170	"	"	"	G. Richard	"
"	4	"	17710	21171	"	"	"	W. J. R. McKindesly, Lennoxville, Que.	"
"	4	Glaubers salts	17711	21172	"	"	"	"	"
"	4	Epsom salts	17712	21173	"	"	"	F. T. Ansell, Sherbrooke, Que.	"
"	4	Phosphoric acid dilute	17713	21174	"	"	"	T. A. Bourque	"
"	4	Baking powder, 'Diamond Star'	17714	21175	"	"	"	Bray Bros.	"
"	4	"	17715	21176	"	"	"	"	"
"	4	"	17716	21177	"	"	"	J. B. Orr, Lennoxville, Que.	"
"	4	"	17717	21178	"	"	"	D. J. Leduc & Co., Montreal.	"
"	4	"	17718	21179	"	"	"	T. Papineurion	"
"	5	Sulphate of ammonia	17719	21180	"	"	"	Dart & Chapman	"
"	5	Glucose	17720	21181	"	"	"	M. Albert	"
"	6	Sulphate of ammonia	17721	21183	"	"	"	"	"
"	6	"	17722	21184	"	"	"	Kerry, Watson & Co.	"
"	6	Phosphoric acid dilute	17723	21185	"	"	"	A. D. Sawyer	"
"	6	Eff. phosphate of soda	17724	21186	"	"	"	"	"
<i>Official Analyst, Dr. F. X. Valade, Ottawa.</i>									
Oct.	1	Alum	14871	20944	None	"	"	W. H. Roger, Ottawa.	"
"	1	Acetic acid	14872	20945	"	"	"	"	"
"	1	Chloride of ammonia	14873	20946	"	"	"	"	"
"	1	Epsom salts	14874	20947	"	"	"	"	"
"	1	Sulphate of soda	14875	20948	"	"	"	E. J. Leger	"
"	1	Phosphoric acid dilute	14876	20949	"	"	"	"	"
"	1	Alum	14877	20950	"	"	"	"	"
"	1	Sulphate of ammonia	14878	20951	0.0003 p. c.	"	"	"	"
"	2	Chloride of ammonia	14879	20952	Faint trace, less than one part in one million.	"	"	Dr. K. D. Graham	"
"	2	Acetic acid	14880	20953	None	"	"	"	"
"	2	Eff. phosphate of soda	14881	20954	About two parts per million.	"	"	"	"
"	2	Sulphite of soda	14882	20955	Less than one part in one million.	"	"	"	"
"	2	Sulphate of iron	14883	20956	"	"	"	Graham & Elliott	"
"	2	Phosphate of soda	14884	20957	None	"	"	"	"
"	2	Eff. phosphate of soda	14885	20958	Less than one part in one million.	"	"	"	"
"	2	Phosphoric acid dilute	14886	20959	None	"	"	"	"
"	2	Glucose	14887	20960	Less than one part in one million.	"	"	"	"
"	2	"	14888	20961	None	"	"	E. J. Leger	"

APPENDIX C.—INSPECTION OF DRUGS AND OTHER ARTICLES FOR ARSENIC—Tabulated Statement—Continued.

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certif- cate.	No. of Sample.	RESULT OF ANALYSIS.		Remarks by Analyst.	Name and Address of Vendor of Sample.
				Arsenious Acid.			
				p. c.			
1901.	<i>Official Analyst, Dr. F. X. Valade, Ottawa.</i> —Continued.						
Oct.	2 Acid phosphate (Horsford's)	14889	20962	None.	..	.....	W. H. Roger, Ottawa.
"	"	14890	20963	"	.....	.....	Dr. K. D. Graham "
"	4 Baking powder, 'English Cream'	14891	20964	"	.....	.....	B. W. Granger "
"	4 "	14892	20965	0·0003 p. c.	.....	.....	Mrs. J. Martin "
"	4 " 'Ajax'	14893	20966	0·0001 p. c.	.....	.....	P. Foisy "
"	4 " 'Forest City'	14894	20967	Very faint trace.	.....	.....	" "
"	8 Sulphate of soda	14895	20968	Faint trace.	.....	.....	Abbotts Drug Store, Smith's Falls.
"	8 Epsom salts.	14896	20969	None.	.....	.....	" "
"	8 Sulphate of iron.	14897	20970	Faintest trace.	.....	.....	" "
"	8 Phosphate of soda	14898	20971	Very faint trace.	.....	.....	Dr. G. S. McCallum "
"	8 Sulphite of soda.	14899	20972	"	.....	.....	" "
"	8 Sulphate of ammonia.	14900	20973	"	.....	.....	" "
"	8 Sulphate of iron.	14694	20974	About one part in 200,000	.....	.....	Wm. Johnston "
"	8 Alum.	14695	20975	Very faint trace.	.....	.....	" "
"	8 Epsom salts.	14696	20976	None.	.....	.....	" "
"	8 Baking powder, 'Crown'	14697	20977	0·00001 p. c.	.....	.....	L. J. Laland "
"	8 " 'Magic'	14698	20978	0·0005 p. c.	.....	.....	Aberdeen Fruit Store "
	<i>Official Analyst, Dr. W. H. Ellis, Toronto.</i>						
Oct.	9 Chloride of ammonium.	16175	22530	None	.....	Free from arsenic.	Jas. Lynch, Peterboro', Ont.
"	9 Sulphate of iron	16176	22531	"	.....	"	H. S. Macdonold "
"	9 Phosphate of soda	16177	22532	"	.....	"	" "
"	9 Phosphoric acid dilute.	16178	22533	"	.....	"	" "
"	9 Phosphate of soda.	16170	22525	"	.....	"	J. D. Tully "
"	9 Epsom salts	16171	22526	A trace.	.....	Contains a trace of arsenic.	" "
"	9 Sulphate of soda.	16172	22527	None	.....	Free from arsenic.	" "
"	9 Alum	16173	22528	"	.....	"	Jas. Lynch "
"	9 Sulphate of ammonia.	16174	22529	"	.....	"	" "
"	10 Acetic acid.	16179	22534	"	.....	"	Sniders Pharmacy, Toronto.
"	10 Eff. phosphate of soda.	16180	22535	"	.....	"	" "

"	10	Sulphite of soda	16181	22536	"	"	"	"	"	"
"	10	Epsom salts	16182	22537	"	"	"	"	"	"
"	10	Sulphate of soda	16183	22538	"	"	"	"	"	"
"	10	Phosphoric acid dilute.	16184	22539	"	"	"	Lyman Bros. & Co.	"	"
"	10	Alum	16185	22540	"	"	"	"	"	"
"	10	Sulphate of ammonia	16186	22541	Trace in 5 grains.	"	Contains a trace of arsenic.	"	"	"
"	10	Chloride of ammonium	16187	22542	None	"	Free from arsenic	"	"	"
"	10	Sulphate of iron	16188	22543	"	"	"	Evans & Sons	"	"
"	10	Glucose	16189	22544	"	"	"	"	"	"
"	10	Phosphate of soda	16190	22545	"	"	"	"	"	"
"	10	Sulphite of soda	16191	22546	"	"	"	"	"	"
"	10	Acid phosphate	16192	22547	"	"	"	Standard Fertilizer Co., Smith's Falls, Ont.	"	"
"	11	Chloride of ammonium	16193	22549	"	"	"	R. Dezell, Port Hope.	"	"
"	11	Acetic acid	16194	22550	"	"	"	"	"	"
"	11	Epsom salts	16195	22552	"	"	"	"	"	"
"	11	Alum	16196	22553	0.0027 p. c.	"	Contains arsenic in the proportion of 0.0027 p. c. arsenic trioxide.	S. T. Hopper	"	"
"	11	Sulphate of ammonia	16197	22554	None	"	Free from arsenic.	"	"	"
"	11	Sulphate of soda	16198	22555	0.0093 p. c.	"	Contains arsenic in the proportion of 0.0093 p. c. arsenic trioxide.	"	"	"
"	11	Sulphate of iron	16199	22556	None	"	Free from arsenic.	T. G. Watson	"	"
"	11	Glucose	16200	22557	"	"	"	"	"	"
"	11	Phosphate of soda	16201	22558	"	"	"	"	"	"
"	11	Baking powder, "English Cream"	16202	22560	"	"	"	Miller & Barfat	"	"
"	11	"	16203	22561	"	"	"	F. H. Brown	"	"
"	11	"	16204	22562	"	"	"	C. P. Collins, Peterboro.	"	"
"	11	"	16206	22563	0.004 p. c.	"	Contains arsenic in the proportion of 0.004 p. c. arsenic trioxide.	W. H. Wrighton	"	"
Official Analyst, F. T. Harrison, London.										
Oct.	4	Sulphite of soda	14409	21975	0.0005	"	Result obtained by comparing with standard tubes.	L. R. Clark, Berlin, Ont.	"	"
"	4	Sulphite of iron	14410	21976	0.0005	"	A possible trace.	"	"	"
"	4	Baking powder, "Kitchen Queen"	14411	21977	0.0003	"	"	S. A. Brubaker	"	"
"	4	Acid phosphate	14412	21978	None	"	"	C. J. Dickson	"	"
"	4	Sulphate of soda	14413	21979	"	"	"	"	"	"
"	4	Chloride of ammonium	14414	21980	0.0003	"	By comparing with standard tubes	L. H. Cant	"	"
"	5	Alum	14415	21981	"	"	"	S. Snyder, Waterloo, Ont.	"	"
"	5	Acetic acid	14416	21982	None	"	"	"	"	"
"	5	Eff. phosphate of soda	14417	21983	0.0001	"	A possible trace.	"	"	"
"	5	Epsom salts	14418	21984	0.0005	"	"	"	"	"
"	5	Baking powder, "English Cream"	14419	21985	0.00297	"	"	E. O. Flaherty, Stratford, Ont.	"	"
"	5	Sulphate of ammonia	14420	21986	0.0001	"	A possible trace.	C. McKargey	"	"
"	8	Baking powder, "Kitchen Queen"	14421	21987	0.0005	"	By comparing with standard tubes	Westbrook & Stalker	"	"
"	8	"	14422	21988	0.0066	"	By comparing with standard tubes	Beattie & Co., St. Mary's Ont.	"	"
"	8	Eff. phosphate of soda	14423	21989	0.0003	"	By comparing with standard tubes	Sidney Fraleigh	"	"
"	8	Acetic acid	14424	21990	None	"	"	"	"	"

APPENDIX C. INSPECTION OF DRUGS AND OTHER ARTICLES FOR ARSENIC. Tabulated Statement. Continued.

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	RESULT OF ANALYSIS.		Remarks by Analyst.	Name and Address of Vendor of Sample.
				Arsenious Acid.			
1901.							
Official Analyst, F. T. Harrison, London. Continued.							
Oct.	9 Alum.	14425	21991	.....	.....	.....	John Callard, London, Ont.
"	9 Chloride of ammonium.	14426	21992	0.0001	.....	A possible trace.	"
"	9 Phosphoric acid dilute.	14427	21993	Merest trace.	.....	.....	D. McCallum & Co., London, Ont.
"	9 Alum.	14428	21994	0.0002	.....	By comparing with stan'd tubes	Kerry, Watson & Co. "
"	9 Glucose.	14429	21995	None.	.....	.....	D. S. Perrin & Co. "
"	9 Sulphate of soda.	14430	21996	"	.....	.....	Cairncross & Lawrence "
"	9 Phosphate of soda.	14431	21997	"	.....	.....	"
"	16 Glauber's salts.	14432	21998	None.	.....	.....	N. J. McDermot "
"	10 Phosphate of soda.	14433	22000	0.00005	.....	A possible trace.	Geo. E. Kennedy "
"	10 Sulphate of iron.	14434	22001	0.00003	.....	"	"
"	10 Glucose.	14435	22002	None.	.....	.....	Mc'ormac "
"	10 Alum.	14436	22003	0.0046	.....	.....	London Coffee and Spice Co., London, Ont.
"	10 Acid phosphate.	14437	22004	0.0004	.....	By comparing with stan'd tubes	"
"	10 Alum.	14437	22005	Trace.	.....	.....	Gorman & Eckhart "
"	10 Acid phosphate.	14439	22006	0.0004	.....	By comparing with stan'd tubes	"
"	10 Glauber's salts.	14440	22008	0.0001	.....	A possible trace.	J. E. Platt "
"	10 Epsom salts.	14441	22009	None, or not more than the merest trace.	.....	.....	J. Callard "
"	"	14442	22010	"	.....	.....	W. T. Strong "
"	11 Baking powder, 'Cooks' Friend'.	14443	22011	"	.....	.....	T. Gray, Toronto.
"	11 Sulphate of iron.	14444	22012	0.00003	.....	A possible trace.	G. Marshall "
"	11 Baking powder, 'Cooks' Friend'.	14445	22013	None, or not more than the merest trace.	.....	.....	Michie & Co. "
"	11 Sulphate of ammonia.	14446	22014	None.	.....	.....	Lyman Bros. & Co., Toronto.
Official Analyst, E. B. Kendrick, Winnipeg.							
Oct.	11 Phosphoric acid dilute	17101	17381	Practically free from arsenic	.....	Genuine	D. E. Clement, Brandon, Man.
"	11 Sulphate of iron.	17102	17382	"	.....	"	"
"	11 Chloride of ammonium	17103	17383	"	.....	"	"

"	11	Phosphate of soda	17104	17384	"	"	Fleming & Sons
"	11	Acetic acid	17105	17385	"	"	"
"	11	Sulphate of soda	17106	17386	"	"	"
"	11	Baking powder, 'Flemmings'	17107	17387	Present	"	"
"	11	Epsom salts	17108	17388	Practically free from arsenic	"	N. J. Halpin
"	11	Alum	17109	17389	"	"	"
"	11	Glaubers salts	17110	17390	"	"	"
"	17	Sulphate of iron	17111	17391	"	"	H. A. Wise, Winnipeg, Man.
"	17	Phosphate of soda	17112	17392	"	"	"
"	17	Chloride of ammonium	17113	17393	Present	"	W. R. Inman & Co.
"	17	Acetic acid	17114	17394	Practically free from arsenic	"	"
"	17	Sulphate of soda	17115	17395	"	"	R. L. Morrison
"	17	Epsom salts	17116	17396	"	"	"
"	18	Phosphoric acid dilute	17117	17397	"	Not diluted phosphoric acid of B.P. Adulterated if sold as such	W. Pulford
"	18	Epsom salts	17118	17398	"	Genuine	"
"	18	Sulphate of ammonia	17119	17399	Present	"	J. C. Gordon
"	18	Alum	17120	17400	"	"	"
"	19	Eff. phosphate of soda	17121	17401	Practically free from arsenic	"	Hudson Bay Co.
"	21	"	17122	17402	"	"	Flexon & Co.
"	21	Glaubers salts	17123	17403	"	"	"
"	21	Alum	17124	17404	"	"	Jackson & Co.
"	21	Glucose	17125	17405	"	"	Martin Bole Wynne Co.
"	21	Sulphate of ammonia	17126	17406	"	"	W. J. Mitchell
"	22	Glucose	17127	17407	"	"	Paulin Chambers & Co.
"	22	Baking powder 'Shield'	17128	17408	"	"	Campbell Bros. & Wilson
"	22	" 'Price's Cream'	17130	17410	"	"	Hudson Bay Co.
"	22	" 'White Star'	17131	17411	Present	Adulterated	"
"	22	" 'Blue Ribbon'	17132	17412	"	"	A. Macdonald
<i>Official Analyst, Dr. C. J. Fagan, Victoria, B.C.</i>							
Nov.	18	Sulphate of iron	16840	21630	None	"	C. Woodward, Vancouver, B.C.
"	18	Alum	16841	21631	Present, less than 1.000 gr. in 10 grains.	"	McDowell, Atkins Watson Co., Vancouver, B.C.
"	18	Phosphate of soda	16842	21632	"	"	"
"	19	Chloride of ammonium	16843	21633	None	"	C. Muddell, Vancouver, B.C.
"	19	Baking powder, 'Cook's Choice'	16844	21634	Present, less than 1.000 gr. in 5 grains.	"	J. Deal, Vancouver, B.C.
"	19	" 'Forest City'	16845	21635	"	"	C. Anderson & Co., Vancouver, B.C.
"	20	" 'Champion'	16846	21636	"	"	H. Alberts, Vancouver, B.C.
"	20	Alum	16847	21637	None	"	Red Cross Pharmacy, Vancouver, B.C.
"	20	Acetic acid	16848	21638	"	"	Nelson McPherson, Sunderland Drug Co., Vancouver, B.C.
"	21	Sulphate of ammonia	16849	21639	Present, less than 1.000 gr. in 10 grains.	"	"

2-3 EDWARD VII., A. 1903

APPENDIX C. INSPECTION OF DRUGS AND OTHER ARTICLES FOR ARSENIC. Tabulated Statement. *Concluded.*

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certif- icate.	No. of Sample.	RESULT OF ANALYSIS.		Remarks by Analyst.	Name and Address of Vendor of Sample.
				Arsenious Acid.			
<i>Official Analyst, Dr. C. J. Fagan, Victoria, B.C. Concluded.</i>							
1901.							
Nov.	21 Phosphoric acid dilute.....	16850	21640	None			C. M. Eddington, Vancouver, B.C.
"	21 Glaubers salts	16851	21641	"			J. R. Seymour
"	21 Epsom salts.....	16852	21642	"			McDowell, Atkins Watson Co., Vancouver, B.C.
"	21 Eff. phosphate of soda.....	16853	21643	"			"
"	21 Glucose.....	16854	21644	"			"
"	22 Sulphite of soda.....	16855	21645	"			J. K. Patton, Vancouver, B.C.
"	22 Epsom salts	16856	21646	"			J. Reed
Dec.	1 Sulphate of iron.....	16857	21647	"			Moore & Co., Victoria, B.C.
"	1 Chloride of ammonium.....	16858	21648	"			"
"	1 Phosphoric acid dilute	16859	21649	"			B. C. Drug Co.
"	1 Alum.....	16860	21650	Present, less than $\frac{1}{1000}$ gr. in 10 grains.			T. Shotbolt
"	1 Acetic acid	16861	21651	None			W. Jackson & Co.
"	1 Glaubers salts	16862	21652	"			J. Cochrane
"	1 Epsom salts	16863	21653	"			Dean & Hiscock
"	3 Eff. phosphate of soda.....	16864	21654	"			C. H. Bowes
"	3 Phosphate of soda.....	16865	21655	"			G. Mornson & Co.
"	3 Sulphite of soda	16866	21656	"			F. W. Fawcett & Co.
"	3 Baking powder	16867	21657	Present, less than $\frac{1}{1000}$ gr. in 5 grains			L. Dickinson & Co.
"	3 " " 'Golden Cream'	16868	21658	"			C. M. Cameron
"	3 Sulphate of ammonia	16869	21659	None			W. Jackson & Co.
"	3 Glucose	16870	21660	"			H. A. Tilley
"	3 Baking powder, 'Hygiene'	16871	21661	Present, = 0.003 grains in 10 grains.		Adulterated	W. A. Burt

INSPECTION OF COFFEE.

APPENDIX D.—INSPECTION OF

Date of Certificate.	Description of Sample, together with Name and Address of Manufacturer, when known.	Date of Analyst's Certifi- cate.	No. of Sample.	RESULT OF					
				Moisture.	Fat.	Aqueous Extract.	Caffeine.	Starch.	Sp. Gr. of 10 p.c. Solution.
1901.	<i>Official Analyst, M. Bowman, Halifax.</i>			p. c.	p. c.	p. c.	p. c.		
Jan. 10..	Coffee.....	17543	20207	3·06	10·73	25·76	1·32	None...	1·0101
" 10..	"	17544	20208	3·21	9·71	34·15	1·11	" ...	1·013
" 17..	"	17545	20209	4·09	9·02	32·58	0·99	" ...	1·013
" 17..	"	17546	20210	3·21	10·16	26·56	1·12	" ...	1·011
" 17..	"	17547	20111	4·81	5·69	35·92	0·70	Present.	1·014
" 18..	"	17548	20212	7·18	10·50	24·48	1·00	None...	1·010
" 18..	"	17549	20213	3·89	4·20	32·38	0·37	Present.	1·012
" 18..	"	17550	20214	3·24	9·40	26·39	1·14	None...	1·010
	<i>Official Analyst, Dr. M. Fiset, Quebec.</i>								
Nov. 13..	Coffee.. ..	13917	21187	4·48	8·92	27·86	1·08	Wheat .	1·0215
" 13..	"	13918	21188	2·64	9·74	23·66	1·22	None...	1·01011
" 13..	"	13919	21189	2·66	9·72	23·20	1·24	" ...	1·0099
" 13..	"	13920	21190	6·70	8·28	29·92	1·04	Wheat .	1·0138
" 13..	"	13921	21191	4·02	7·10	31·98	1·00	None...	1·0141
" 13..	"	13922	21192	4·96	8·90	23·06	1·10	" ...	1·0099
" 13..	"	13923	21193	2·22	8·40	23·82	1·18	" ...	1·0098
" 13..	"	13924	21194	3·84	9·20	23·62	1·20	" ...	1·0099
	<i>Official Analyst, A. L. Tourchot, St. Hyacinthe.</i>								
Jan. 9..	Coffee.. ..	17725	21201	3·33	8·86	25·28	0·94	.....	1·0108
" 9..	"	17726	21202	2·32	9·99	25·96	0·84	.....	1·0103
" 10..	"	17727	21204	2·04	9·80	30·24	0·60	.....	1·0126
" 10..	"	17728	21205	2·47	8·48	30·30	1·00	.....	1·0132
" 11..	"	17729	21206	1·70	7·58	36·90	0·72	.....	1·0534
" 11..	"	17730	21207	1·96	10·80	27·20	1·17	.....	1·0108
" 14..	"	17731	21208	2·37	9·91	26·10	0·96	.....	1·0106
" 14..	"	17732	21209	3·30	8·22	29·16	0·87	.....	1·0117
" 14..	"	17733	21210	2·60	7·75	29·70	0·31	.....	1·0125
	<i>Official Analyst, Dr. F. X. Valade, Ottawa.</i>								
Nov. 11..	Coffee.....	17901	22576	4·88	6·22	33·80	0·77	.....	1·0117
" 11..	"	17902	22577	2·83	8·54	22·56	0·97	.....	1·0070
" 11..	"	17903	22578	5·70	9·39	23·70	1·00	.....	1·0082
" 11..	"	17904	22579	2·73	8·68	18·65	1·05	.....	1·0050
" 11..	"	17905	22580	2·84	9·20	20·96	1·01	.....	1·0064
" 11..	"	17906	22581	3·24	9·04	21·37	1·02	.....	1·0065
" 11..	"	17907	22582	2·42	9·62	21·28	1·01	.....	1·0067

SESSIONAL PAPER No. 14

COFFEE—Tabulated Statement.

ANALYSIS.					Remarks by Analyst.	Name and Address of Vendor of Sample.
Ash.						
Total.	Water Soluble.	Acid Soluble.	Insoluble.	Foreign Substances by Microscope		
p. c.	p. c.	p. c.	p. c.			
4.16	3.36	0.74	0.06		Adulterated with a little chicory	W. A. Smith, Kentville, N.S.
4.13	3.17	0.83	0.13		"	DeWolf & Lamont "
4.85	3.60	0.93	0.32		"	B. O. Bishop, Dartmouth, N.S.
4.61	3.60	0.81	0.20		"	G. A. Orman "
4.62	3.12	1.11	0.39		Adulterated with chicory, also with farinaceous matter.	S. Thomson "
4.59	3.67	0.79	0.13		Adulterated with a little chicory	J. A. Deaman & Co., Halifax.
5.14	2.97	1.63	0.54		Adulterated with chicory, also with farinaceous matter.	H. W. Wentzell "
5.03	3.69	1.06	0.28		Adulterated with a little chicory	A. P. Torrens "
4.84	3.74	0.72	0.38		Adulterated with chicory and wheat starch.	D. Audette, Windsor Mills, Que.
4.90	3.70	0.78	0.42		Genuine.....	W. S. Samson "
4.26	3.38	0.80	0.08		"	C. A. Miller "
5.26	3.26	1.16	0.84		Adulterated with wheat and chicory.	P. J. Girard, Richmond, Que.
4.28	3.16	0.98	0.14		Adulterated with about 20 p.c. chicory.	Theo. Julien, Quebec.
4.38	3.52	0.82	0.04		Genuine.....	J. E. Blais "
4.30	3.52	0.74	0.04		"	A. St. Cyr "
4.62	3.66	0.60	0.36		"	D. Teiczervitz "
4.25	3.61	0.57	0.07		Pure.....	H. Robert, St. Hyacinthe.
4.12	3.30	0.71	0.11		"	V. Marceau "
4.95	3.69	0.93	0.33		Contains 10 to 15 p.c. chicory.	J. Raby, St. Henri.
4.88	3.78	0.88	0.22		" 15 to 20 "	J. A. Dore, St. Cunegonde.
4.72	3.59	0.86	0.36		Adulterated with from 20 to 25 p.c. chicory.	A. Marsolais, 1660 Ontario St., Montreal.
4.28	3.50	0.68	0.10		Pure.....	E. Mercier, 1270 De Montigny, Montreal.
4.28	3.64	0.58	0.06		"	C. Brosseau & Co., St. John, Que.
4.76	3.08	1.28	0.40		Adulterated with about 10 p.c. chicory.	A. Gibeau "
4.54	3.50	0.80	0.24		Adulterated with from 10 to 15 p.c. chicory and starch.	Simard, Brossard & Co. "
3.93	1.32	2.43	0.18	About 10 p.c. roasted peas and chicory.	Adulterated.....	M. H. McVeity, Ottawa.
4.49	1.15	3.33	0.01	None.....	Genuine.....	C. Moreland "
4.99	2.11	2.52	0.36	"	"	E. Lafontaine "
4.19	0.98	3.17	0.04	"	"	Mrs. A. Macdonald "
4.48	1.11	3.35	0.02	"	"	R. A. Cochrane, Almonte, Ont.
4.79	1.27	3.36	0.16	"	"	Robt. Cochrane "
4.71	1.37	3.26	0.08	"	"	Jas. Robertson "

APPENDIX D.—INSPECTION OF

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	RESULT OF					
				Moisture.	Fat.	Aqueous Extract.	Caffeine.	Starch.	Sp. Gr. of 10 p.c. Solution.
1901.	<i>Official Analyst, Dr. W. H. Ellis, Toronto.</i>			p. c.	p. c.	p. c.	p. c.	p. c.	
Nov. 29..	Coffee.....	16207	22583	2·15	10·62	23·12	1·26	.....	1·0105
" 29..	" Compound ..	16208	22584	5·27	5·28	23·12	0·82	..	1·0103
" 29..	"	16209	22585	2·52	8·04	22·23	0·45	.....	1·0103
" 29..	"	16210	22586	1·82	4·75	22·41	0·32	.....	1·0105
" 29..	"	16211	22587	2·97	6·65	37·05	0·50	.....	1·0146
" 29..	"	16212	22588	2·33	8·40	23·94	0·42	.....	1·0106
" 30..	"	16213	22591	4·70	5·10	34·76	0·26	3·62	1·0158
" 30..	"	16214	22592	3·59	7·67	31·41	0·40	7·16	1·0124
	<i>Official Analyst, F. T. Harrison, London, Ont.</i>								
" 25..	Coffee.....	14444	22015	4·88	13·30	21·14	1·35	None...	1·0103
" 25..	"	14445	22016	3·48	11·02	30·42	1·19	" ..	1·0139
" 25..	"	14446	22017	2·10	14·00	22·25	1·42	" ..	1·0103
" 25..	"	14447	22018	2·05	14·18	23·02	1·54	" ..	1·0102
" 26..	"	14448	22019	4·43	11·05	23·14	1·20	" ..	1·0103
" 26..	"	14449	22020	4·76	11·46	25·70	1·16	" ..	1·0112
" 26..	"	14450	22021	3·39	10·92	25·76	1·21	" ..	1·0113
	<i>Official Analyst, E. B. Kenrick, Winnipeg.</i>								
Dec. 9..	Coffee..	17133	17413	2·98	10·88	21·57	1·30	.....	1·0080
" 9..	"	17134	17414	2·14	11·73	21·60	1·30	.....	1·0080
" 9..	"	17135	17415	2·36	11·75	22·40	1·28	.....	1·0083
" 9..	"	17136	17416	2·35	10·90	21·42	1·35	.....	1·0080
" 9..	"	17137	17417	1·73	12·23	24·03	1·41	.....	1·0089
" 9..	"	17138	17418	3·18	11·83	27·60	1·34	.....	1·0100
	<i>Official Analyst, Dr. C. J. Fagan, Victoria, B.C.</i>								
" 19..	Coffee.....	16834	21662	5·41	9·41	32·25	1·40	.....	1·008
" 19..	"	16835	21663	1·20	6·80	28·50	1·10	.....	1·01
" 20..	"	16836	21664	3·75	4·90	50·20	0·50	7·20	1·016
" 20..	"	16837	21665	12·68	6·80	33·45	1·30	.....	1·008
" 21..	"	16838	21666	3·01	6·90	37·20	0·70	4·10	1·013
" 21..	"	16839	21667	4·46	8·00	27·25	1·50	1·010

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COFFEE—Tabulated Statement—*Concluded.*

ANALYSIS.					Remarks by Analyst.	Name and Address of Vendor of Sample.
Ash.						
Total.	Water Soluble.	Acid Soluble.	Insoluble.	Foreign Substances by Microscope.		
p. c.	p. c.	p. c.	p. c.			
4.15	3.10	0.77	0.28	.....	Genuine	F. H. Wiley, Hamilton, Ont.
3.94	3.13	0.73	0.08	.....	" .....	J. Allen "
4.63	3.73	0.72	0.18	.....	" .....	Holt & Co. "
3.95	3.25	0.66	0.04	.....	" .....	M. E. Bush & Co., 285 College St., Toronto.
4.17	3.07	0.90	0.20	Chicory	Adulterated by admixture with about 25 p.c. of chicory.	Case's Grocery, 455 Yonge St., Toronto.
3.84	3.10	0.62	0.12	.....	Genuine	F. Patience, 455 Yonge St., Toronto.
4.01	2.85	0.90	0.26	A chicory and pea starch.	Adulterated by chicory and farinaceous matter to the extent of 25 p.c. or more.	Miss Ledingham, Myrtle, Ont.
3.85	2.93	0.80	0.12	Chicory and wheat starch.	Adulterated by admixture with chicory and wheat starch to the extent of at least 10 p.c.	" "
4.08	3.35	0.70	0.12	.....	Unadulterated	P. Conlon, London, Ont.
4.18	3.20	0.93	0.13	.....	Adulterated with chicory.....	Mrs. Smith "
4.11	3.38	0.70	0.10	.....	Unadulterated	W. E. Ross, St. Thomas, Ont.
4.04	3.36	0.82	0.10	.....	" .....	A. McKenzie "
4.23	3.38	0.78	0.09	.....	" .....	Tudhope Bros., Woodstock, Ont.
4.18	3.11	0.84	0.23	.....	Adulterated with chicory.....	John Scott & Co. "
4.32	3.30	0.92	0.17	.....	" .....	C. A. O'Neill, Ingersoll.
4.72	3.65	.....	.....	.....	Genuine	C. McDonald, Winnipeg.
4.26	3.37	.....	.....	.....	" .....	Thos. Hartley "
4.35	3.30	.....	.....	.....	" .....	Hardy & Buchanan "
4.36	3.42	.....	.....	.....	" .....	Matheson Bros. "
4.50	3.48	.....	.....	.....	" .....	A. Macdonald "
4.32	3.38	.....	.....	.....	" .....	J. A. McKircher "
3.82	2.56	1.10	0.16	.....	" .....	J. R. Johnson, Vancouver, B.C.
3.92	2.91	0.93	0.08	Chicory ..	Adulterated.....	City Grocery Company, Vancouver, B.C.
3.48	2.38	0.92	0.18	Chicory and starch.	"	Clarke & Rogerson, Vancouver, B.C.
3.92	2.88	0.72	0.12	.....	Genuine	J. Donald & Co. "
3.76	2.74	0.94	0.08	Chicory and starch.	Adulterated	Eagett & Co. "
3.90	2.75	1.04	0.11	Genuine	C. E. Tanner "

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APPENDIX E.—INSPECTION OF COCOA

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	RESULTS OF							
				Moisture.	Cacao Butter.	Extract by (0.825) Alcohol.	In Alcohol Extract.			Warm Water Extract.	Residue.
							Theobroma.	Reducing substances as Dextrose.	Cane Sugar.		
1902.	<i>Official Analyst, A. L. Tourehot, St. Hyacinthe.</i>			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Jan. 25	Cocoa (bulk), Cowan & Co., Toronto.	17734	20980	7.56	9.60	11.00	1.14	1.80	2.77	17.02	54.82
" 25	Cocoa (Huyler's), Huyler, New York.	17735	20931	4.36	35.18	8.04	0.61	0.90	1.39	14.09	38.76
" 25	Chocolate Powder, Crosse & Blackwell, London, Eng.	17736	20982	5.50	19.86	29.68	0.30	2.80	18.59	7.11	38.63
" 25	Cocoatina, H. Schweitzer & Co., London, Eng.	17737	20983	5.12	28.68	9.33	0.65	1.44	0.28	11.55	45.30
" 25	Cocoa Essence, Cadbury, London, Eng.	17738	20984	5.02	23.77	10.27	0.40	1.05	0.65	10.34	50.59
" 25	Chocolate (Ceylon Rock), Cowan & Co., Toronto.	17739	20985	1.09	20.15	29.76	0.33	0.52	10.27	38.04	11.06
" 25	Cocoa (bulk), Dominion Mills Co., Toronto.	17740	20986	3.46	16.82	44.16	0.28	0.67	25.72	5.51	30.04
" 25	Cocoa Beans, Baker & Co..	17741	20987	4.75	43.77	9.76	0.48	0.88	0.43	9.07	32.16
" 25	Cocoa Nibs, Baker & Co....	17742	20988	2.90	48.31	10.67	0.38	0.50	0.11	8.00	30.12

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AND CHOCOLATE—Tabulated Statement.

ANALYSIS							
Melting point of Fat.	Ash.			Total.	Reaction of warm water extract with Tincture Iodine.	Starch.	Remarks by Analyst.
	Water Soluble.	Soluble in Hydrochloric Acid.	Insoluble in Hydrochloric Acid.				
	p. c.	p. c.	p. c.	p. c.		p. c.	Name and Address of Vendor of Sample.
30 to 31°C.	3.82	2.24	0.50	6.56	None.....	None.	No foreign starch; not adulterated.
31 to 33°C.	1.80	2.58	0.20	4.58	" . . .	11.92	" " "
29 to 31°C.	1.33	1.09	0.18	2.60	Blue.....	21.52	Wheat starch; not adulterated, being sold as a mixture.
31 to 33°C.	4.67	1.52	0.06	6.25	None.....	10.42	No foreign starch; not adulterated.
33 to 35°C.	1.46	3.18	0.10	4.74	"		" " "
33 to 35°C.	0.68	0.55	0.03	1.26	"		" " "
33 to 35°C.	1.89	0.40	0.08	2.37	Intense blue.	3.36	Maize starch; no mention of it being sold as a mixture, therefore adulterated.
33 to 36°C.	1.76	1.48	0.08	3.32	.....		Pure, no other constituents than those of cacao.
34 to 35°C.	1.44	1.46	0.02	2.92	None.....		" " "
							Messrs. Bate & Co., Ottawa.
							" " "
							Kavanagh Bros., Ottawa.
							" " "
							" " "
							" " "
							Messrs. Baker & Co., Dorchester, Mass., U.S.A.

APPENDIX E. INSPECTION OF COCOA AND CHOCOLATE—Tabulated Statement—*Concluded.*

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.								Remarks by Analyst.	Name and Address of Furnisher of Sample.
				Loss by Drying at 100 C.	Fat.	Loss in Lixivating with Warm Water.	Residue, Starch, Fibre, &c.	Reducing Sugar as Dextrose.	Cane Sugar.	Total Nitrogen.	Theobromine.	Proteids.	
				p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	
1901.	<i>Official Analyst, F. T. Harrison, London, Ont.</i>												
July 27...	Cacao Nibs...	14402	...	3.28	51.68	...	...	None.	None.	2.18	1.03	11.62	Walter Baker & Co.
" 27...	Cacao mass...	14403	...	4.57	51.70	13.40	30.33	...	...	2.06	1.05	10.81	Ganong, St. Stephens, N.B.
" 27...	Chocolate; Walter Baker & Co...	14404	...	3.33	52.90	12.60	31.17	...	...	2.09	1.12	10.88	
" 27...	Baker's Breakfast Cocoa...	14405	...	6.40	26.15	19.00	48.45	...	...	3.31	1.65	17.43	Walter Baker & Co.
" 27...	German Sweet Chocolate, Baker & Co.	14406	...	1.63	23.03	64.10	11.24	1.41	52.14	0.88	0.73	4.13	"
" 27...	Baker's Broma...	14407	...	4.96	24.00	34.60	36.28	5.12	24.10	1.02	0.74	4.94	"
" 27...	Epps' Cocoa...	14408	...	4.62	27.35	32.27	35.76	1.31	25.56	1.17	0.74	5.87	

APPENDIX F.—INSPECTION OF CHEESE Tabulated Statement.

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Sample.	Result of Analysis.										Remarks by Analyst.	Name and Address of Vendor of Samples.	
			Total acidity as lactic ac.	Total Nitro-gen.	Caseids N. 6.25.	Total Ash.	Moisture.	Fat.	Alcohol Ex-tract.	Hot Water Extract.	Insoluble Caseine.				
			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.				
<i>Official Analyst, A. L. Tourchoot, St. Hyacinthe.</i>															
April,	28 Cheese														
		23317	3.56	4.20	26.25	4.01	29.99	35.79	10.48	7.16	16.54			Longtin, Freres & Cie, St. Johns, P.Q.	
"	"	23318	4.46	3.68	22.97	5.63	33.65	34.89	15.53	5.87	10.06			"	
"	"	23319	4.41	4.48	28.00	3.95	33.44	32.49	8.90	6.28	18.89			"	
"	"	23320	3.56	4.02	25.11	3.32	42.04	26.12	12.59	7.72	11.53			"	
"	"	23321	2.93	4.17	26.07	3.52	33.14	34.59	12.43	5.87	13.97			"	
"	"	23322	2.48	4.03	25.20	4.82	47.40	20.54	11.03	5.49	15.54			Alf. Francoeur & Son	
"	"	23323	3.47	4.31	27.32	3.21	32.88	32.01	11.82	6.17	17.12			"	
"	"	23324	3.51	4.17	26.07	4.29	30.86	33.34	11.98	5.41	18.41			F. N. Chagnon, Sorel, P.Q.	
"	"	23325	4.37	4.72	29.49	5.96	19.49	42.78	13.45	6.67	17.61			Pagnuelo & Freres, St. Hyacinthe.	
"	"	23326	4.09	4.16	25.99	3.43	33.35	31.47	8.97	3.32	22.89			V. Marceau	
May,	"	23327	3.87	4.17	26.08	4.32	30.72	34.19	9.58	6.76	18.75			Pagnuelo & Freres	
"	"	23328	4.05	3.95	24.67	3.92	35.59	30.48	15.44	4.94	13.55			"	

APPENDIX G.

BULLETIN No. 79.—OIL OF TURPENTINE.

OTTAWA, October 29, 1901.

W. J. GERALD, Esq.,

Deputy Minister of Inland Revenue.

SIR,—In January last, application was made to the department by certain dealers in the article to have this branch examine samples of oil of turpentine in order to determine whether or not they were genuine. It was alleged that impure oil of turpentine was being imported into Canada, that the impurity was foreign matter of the nature of petroleum, and that sometimes the article contained an excessive percentage of resinous matter. Samples were offered for analysis by parties engaged in the trade, but their origin being unknown it was not deemed wise to undertake their examination. At the same time, oil of turpentine being a standard article and a drug distinctly defined in the British Pharmacopœia, it was thought advisable to recommend that a collection of samples should be made in the manner prescribed by the Adulteration Act, and that they should be submitted to the district analysts for examination as to their purity. This proposal was approved by the Hon. the Minister of Inland Revenue in February, but it was not found possible to make the collection until June of the present year. The source of the samples is stated in table No. 1. of this report together with the results obtained by the analysts in testing them and the opinions which they express concerning them. The duplicate samples were submitted to Mr. A. McGill, B.A., of this laboratory, who subjected them to a very detailed and thorough examination, the results of which are given in his report hereto appended. In all fifty samples were collected, of which only two were pronounced adulterated by the district analysts. Mr. McGill, however, points out six other cases, the genuine character of which is very doubtful. This would indicate that sixteen per cent of the oil of turpentine sold in the open market is adulterated, and justifies the suspicions entertained by the parties who brought the subject to the attention of the department.

I have to recommend the publication of this and Mr. McGill's report.

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

SAMPLES OF OIL OF TURPENTINE.

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TABLE

RESULTS of the Examination of 48

Date of Collection.	No. of Sample.	Quantity purchased.	Cost.	Name and Address of Vendor.	RESULTS			
					Sp. gr. at 15.5°C.	Colour.	Boiling Point. Centigrade.	Distillate from 100cc. under.
1901.			\$ cts.	<i>Official Analyst, Mr. Bowman, Halifax, N.S.</i>				
				<i>Halifax, N.S.</i>				
June 6	20049	1 quart.	0 40	T. M. Power & Sons, druggists, Gottingen street.	0.8699	.....	156°..	180 C. 95 p.c.
" 7	20050	" ..	0 18	W. B. Arthur & Co., hardware merchants.	0.8666	.....	158°..	180 C. 95 p.c.
" 7	20051	" ..	0 25	A. A. Thompson, druggist, Agricola street.	0.8680	.....	157°..	180 C. 94 p.c.
				<i>St. John, N.B.</i>				
" 4	17785	1 lb....	0 75	The McDiarmid Drug Co., Ltd., Market Square.	.....	.....	.....	.....
" 4	17787	2 lbs...	1 00	T. B. Barker & Son, druggist, 37 King street.	.....	.....	.....	.....
				<i>Official Analyst, Dr. M. Fiset, Quebec.</i>				
				<i>Montreal.</i>				
" 3	19830	1 quart.	0 20	J. Denis, hardware merchant, 236 St. Lawrence street.	0.864	White, but turbid.	160°..	.....
				<i>Quebec.</i>				
" 6	19833	" ..	0 20	Lajeunesse et Frere, hardware merchant, 773 St. Valier street.	0.8679	White, but not quite clear.	159°..	.....
				<i>Richmond, P.Q.</i>				
" 7	19835	" ..	0 20	J. Sullivan, painter, Main street.	0.8708	White and clear.	159.5°..	.....
				<i>St. Hyacinthe, P.Q.</i>				
" 11	19837	" ..	0 35	E. St. Jacques, druggist, Cascade street.	0.8928	Yellowish, but clear.	162.5 ..	.....
" 11	19838	" ..	0 20	U. Beaunoyer, paint and oil merchant, Cascade street.	0.8690	" ..	160 ..	.....
				<i>Official Analyst, A. L. Tourchot, St. Hyacinthe.</i>				
				<i>Granby, P.Q.</i>				
June 18	19839	" ..	0 20	Montly Bros., general store..	0.866	.....	156°..	180 C. 96 p.c.
" 18	19840	" ..	0 20	N. Mitchell, general store...	0.867	.....	156°..	96 p.c.
" 18	19841	" ..	0 30	Dy. St. Onge, druggist.....	0.892	150°..	87 p.c.
" 18	19842	" ..	0 30	J. E. Dozois, Druggist..	0.870	154 ..	95 p.c.

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I.

Samples of Oil of Turpentine.

OF ANALYSIS.							No. of Sample.	Remarks by Analyst.	Serial Number.
Residue from 100cc. mes.	Solubility in Glacial Acetic Acid.	Specific Rotation.	Flash Point.	Residue in Asbestos at 100°c.	Residue in Asbestos at 180°c.	Loss between 100 c. and 180 c. in Asbestos.			
p. c.					p. c.	p. c.			
.....	Soluble.....						20049	Genuine	33
.....	"						20050	"	34
.....	"						20051	"	35
.....							17785	.....	5
.....							17787	.....	6
1.060	Not quite homogeneous.		46°-48°c.				19830	Genuine.. . . .	12
0.915	"		46°-48°c.				19833	"	13
1.913	"		41°-43°c.				19835	"	14
5.76	Homogeneous.		42°-43°c.				19837	Adulterated with rosin oil.	15
0.968	Not quite homogeneous.		42°-44°c.				19838	Genuine.. . . .	16
3.10	Soluble.			24.45	15.38	9.07	19839	.....	17
2.0	"			22.58	13.54	9.04	19840	.....	18
14.0	Incomplete			33.33	19.99	13.34	19841	Impure containing resin...	19
4.0	Soluble and limpid.....			24.27	15.58	8.69	19842	20

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RESULTS of the Examination of 48

Date of Collection.	No. of Sample.	Quantity purchased.	Cost.	Name and Address of Vendor.	RESULTS			
					Sp. Gr. at 15.5 C.	Colour.	Boiling Point. Centigrade.	Distillate from 100cc. under.
1901.			\$ cts.	<i>Official Analyst, A. L. Touchot, St. Hyacinthe.</i>				
				<i>Magog, P.Q.</i>				
June 20	19843	1 quart.	0 25	Gilbert Morrier, paints.....	0.871	.....	154°..	180° C. 95 p.c.
" 20	19844	" ..	0 25	A. D. Martin, paints.....	0.875	.....	152° to 153°..	93 p.c.
				<i>Sherbrooke, P.Q.</i>				
" 20	19845	" ..	0 25	J. R. McBain, druggist.....	0.868	.....	154°..	96 p.c.
" 20	19846	" ..	0 20	Kerr & Foss, hardware.....	0.867	.....	154°..	98 p.c.
" 20	19847	" ..	0 19	Coderre Bros. & Co., hardware	0.866	.....	153 to 154°..	98 p.c.
" 20	19848	" ..	0 22	G. N. Bourque, paints.....	0.869	.....	154°..	96 p.c.
" 20	19849	" ..	0 30	G. Richard, Druggist.....	0.869	.....	155°..	98 p.c.
				<i>St. John, P.Q.</i>				
" 25	19850	" ..	0 20	Côté et Frère, hardware.....	0.868	.....	153 to 154°..	97 p.c.
" 25	19851	" ..	0 30	Dr. Savarin, druggist.....	0.893	.....	148°..	85 p.c.
" 25	19852	" ..	0 20	Gervais et Frère, general store	0.869	.....	153 to 154°..	97 p.c.
				<i>Cowansville, P.Q.</i>				
" 25	19853	" ..	0 20	McClatchie Bros., hardware.	0.862	.....	153°..	96 p.c.
				<i>Sweetsburg, P.Q.</i>				
" 25	19854	" ..	0 23	C. H. Boright, general store.	0.875	.....	153 to 154°..	92 p.c.
				<i>Official Analyst, Dr. F. X. Valade, Ottawa.</i>				
				<i>Ottawa.</i>				
May 30	20848	" ..	0 30	J. Skinner & Co., druggist...	0.8698	.....	150°..	162° C. 80 p.c.
" 30	20849	3 pints.	0 30	Josh. Archambault, oil and colour merchant, Dalhousie St.	0.8659	.....	148°..	165° C. 80 p.c.
" 30	20850	1 quart.	0 23	J. B. Duford, oil and colour merchant, Rideau St.	0.8662	.....	156°..	163° C. 80 p.c.
				<i>Peterboro', Ont.</i>				
June 5	20851	" ..	0 23	A. E. Micks & Co., oil and colour merchants.	0.8669	.....	159°..	162° C. 80 p.c.
" 5	20852	" ..	0 20	Peterboro' Hardware Co.....	0.8637	.....	158°..	165° C. 80 p.c.
				<i>Official Analyst, Dr. W. H. Ellis, Toronto.</i>				
				<i>Peterboro', Ont.</i>				
" 5	20862	" ..	0 25	Peterboro' Hardware Co.....	0.8654	155°..	185° C.

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Samples of Oil of Turpentine.—*Continued.*

OF ANALYSIS.									
Residue from 100cc. grains	Solubility in Glacial Acetic Acid.	Specific Rota- tion.	Flash Point.	Residue in Asbestos at 100°c.	Residue in Asbestos at 180°c.	Loss between 100 and 180°c. in Asbestos.	No. of Sample.	Remarks by Analyst.	Serial Number.
				p. c.	p. c.	p. c.			
4.0	Sol. and limp.	.....	.....	26.45	15.77	10.68	19843	.....	21
6.0	"	.....	.....	26.04	15.54	10.50	19844	Doubtful	22
3.0	"	.....	.....	21.15	14.49	6.66	19845	.....	23
2.0	"	.....	.....	18.39	10.20	8.19	19846	.....	24
2.0	"	.....	.....	16.71	9.87	6.84	19847	.....	25
3.0	"	.....	.....	21.28	13.59	7.69	19848	.....	26
3.0	"	.....	.....	22.13	13.48	8.65	19849	.....	27
2.50	"	.....	.....	20.48	11.80	8.68	19850	.....	28
16.0	Incomplete	.....	.....	30.28	15.45	14.83	19851	A bad product—contains resin	29
3.0	Soluble	.....	.....	22.33	12.96	9.37	19852	.....	30
3.0	"	.....	.....	17.93	9.58	8.35	19853	.....	31
6.0	Soluble and limpid	.....	.....	26.69	16.33	10.36	19854	Doubtful	32
2cc. of 1 in 1. red oil.	.....	.....	.....	.....	.....	.....	20848	Genuine	36
7cc. of 1 in 1. red oil.	.....	.....	.....	.....	.....	.....	20849	"	37
" .. 1 in 1.	.....	.....	.....	.....	.....	.....	20850	"	38
3cc. of 1 in 1. yellow oil.	.....	.....	.....	.....	.....	.....	20851	"	39
6cc. of 1 in 1. yellow oil.	.....	.....	.....	.....	.....	.....	20852	"	40
.....	Incomplete	15.2	.....	.....	.....	.....	20862	"	41

Date of Collection.	No. of Sample.	Quantity purchased.	Cost.	Name and Address of Vendor.	RESULTS			
					Sp. gr. at 15.5 C.	Colour.	Boiling Point. Centigrade.	Distillate from 100cc. under.
1901.			\$ cts.	<i>Official Analyst, Dr. W. H. Ellis, Toronto. Toronto.</i>				
June 6	20863	1 quart.	0 15	Elliott & Co., wholesale druggist, Front St.	0.8692	.....	160°..	165°C.
" 6	20864	" ..	0 20	Thos. Meredith & Co., hardware merchants, King St.	0.8680	.....	155°..	165°C.
" 6	20865	" ..	0 20	The Harris Co., Ltd., oil and colour merchants, King St.	0.8683	.....	158°..	163°C.
" 6	20866	" ..	0 20	Lyman Bros. & Co., wholesale druggist.	0.8688	.....	160°..	165°C.
" 6	20867	" ..	0 20	Russill & Co., hardware merchants, King St.	0.8555	.....	158°..	185°C.
				<i>Official Analyst, F. T. Harrison, London, Ont. Stratford, Ont.</i>				
June 3	19492	" ..	0 25	W. H. Thomson, druggist... Windsor, Ont.	0.8692	.....	154°..	170°C. 99.11 p.c
" 4	19495	" ..	0 25	H. O. Fleming, druggist.... London, Ont.	0.8676	.....	155°..	170°C. 99.59 p.c
" 5	19497	" ..	0 25	C. McCallum, druggist. ..	0.8620	.....	155°..	180°C. 99.68 p.c
" 5	19499	" ..	0 25	James Wright, hardware merchant.	0.8664	.....	156°..	174°C. 97.71 p.c
" 5	19500	" ..	0 25	A. Westman, hardware merchant.	0.8681	.....	154°..	172°C. 99.38 p.c
				<i>Official Analyst, E. B. Kenrick, Winnipeg. Winnipeg, Man.</i>				
" 4	17330	" ..	0 25	Graham & Rolston, hardware merchants.	0.8666	Yellow, with a strongly marked blue fluorescence.	156.5°..	167.5°C. 95.5 p.c
" 4	17331	" ..	0 25	R. Wyatt, hardware merchant.	0.8680	"	156.5°..	165.5°C. 95.2 p.c
" 4	17332	" ..	0 25	J. H. Ashdown, hardware merchant.	0.8674	"	156°..	166°C. 94.4 p.c
" 4	17333	" ..	0 20	G. F. Stephens & Co., oil and colour merchant.	0.8680	"	156.5°..	167.5°C. 96.1 p.c
				<i>Official Analyst, Dr. C. J. Fagan, Vancouver, B.C. Vancouver, B.C.</i>				
" 4	21579	" ..	0 50	J. K. Patton, druggist ...	0.8715	Limpid colourless.	155 ..	161°C.

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Samples of Oil of Turpentine—Continued.

OF ANALYSIS.

Residue from 100cc. gram- mes.	Solubility in Glacial Acetic Acid.	Specific Rota- tion.	Flash Point.	Residue in Asbestos at 100 c.	Residue in Asbestos at 180 c.	Loss between 100 c. and 180 c. in As- bestos.	No. of Sample.	Remarks by Analyst.	Serial Number.
				p. c.	p. c.	p. c.			
.....	Complete....	13.03	.....	.....	.....	.....	20863	Genuine	42
.....	"	15.54	.....	.....	.....	.....	20864	"	43
.....	Incomplete....	14.39	.....	.....	.....	.....	20865	"	44
.....	"	15.14	.....	.....	.....	.....	20866	"	45
.....	Complete.....	15.35	.....	.....	.....	.....	20867	Specific gravity too low, of doubtful composition.	46
0.89	Soluble in own volume.	.....	.....	.....	.....	.....	19492	Character and tests correspond to B.P. except residue is high. Genuine.	7
0.41	"	.....	.....	.....	.....	.....	19495	Corresponds to B.P. tests and character. Genuine.	8
0.32	"	.....	.....	.....	.....	.....	19497	"	9
0.29	"	.....	.....	.....	.....	.....	19499	"	10
0.62	"	.....	.....	.....	.....	.....	19500	"	11
.....	17330	Genuine.	1
.....	17331	"	2
.....	17332	"	3
.....	17333	"	4
A small quantity.	In an equal volume.	21579	"	47

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RESULTS of the Examination of 48

Date of Collection.	No. of Sample.	Quantity Purchased.	Cost.	Name and Address of Vendor.	RESULTS			
					Sp. gr. at 15°C.	Colour.	Boiling Point. Centigrade.	Distillate from 100cc. under.
1901.				S. Cts. <i>Official Analyst, Dr. C. J. Fagan, Vancouver, B.C.</i>				
				<i>Vancouver, B.C.</i>				
June 4	21582	1 quart.	0 20	McLennan & McFeely, hardware merchants.	0·869	Limpid greenish yellow.	154°..	158°C. 99 p.c.
				<i>Victoria, B.C.</i>				
" 5	21585	1 " ..	0 30	J. W. Mellor.. .. .	0·869	Limpid colourless.	154°..	160°C. 98·8 p.c.
" 5	21586	1 " ..	0 35	R. Lettier	Limpid yellowish.	154°..	158°C. 98·5 p.c.

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LABORATORY OF THE INLAND REVENUE DEPARTMENT,
OTTAWA, October 24, 1901.

THOS. MACFARLANE, Esq., F.R.S.C., &c.,
Chief Analyst.

SIR,—I have the honour to submit herewith the results of my investigation of oil of turpentine. This matter was placed in my hands in June last, and would have been reported upon some time ago but for illness. Other demands upon me, since returning to the laboratory, have delayed its completion, and must also account for any deficiencies in it.

Owing to the fact that most of the tests applicable to turpentine are physical rather than chemical in the strict sense, and require larger quantities of material, I should recommend that at least two pints of each sample be furnished to the analysts, where practicable.

I have the honour to be, sir,
Your obedient servant

A. MCGILL.

Oil of Turpentine,

Oil of turpentine, or Terebinthinæ Oleum of the British Pharmacopœia, is thus described by that authority: 'The oil distilled, usually by the aid of steam, from the oleoresins obtained from *Pinus sylvestris* and other species of *Pinus*; rectified if necessary.'

Squire's Companion to the Pharmacopœia gives the following additional information as to the sources of oil of turpentine. 'The oil of turpentine sold in Britain is almost wholly imported from America, and is the product (mainly) of *Pinus australis* and *P. tæda*. German and Russian oil is chiefly distilled from *P. sylvestris*, French oil from *P. maritima*, Hungarian turpentine is distilled from the cones of *P. pumilis*, and Carpathian turpentine from *P. cembra* or *P. pumilio*.'

According to Long (1) American turpentine is distilled from gum which is collected from notches cut in the trees, or from that (technically known as *Scrape*) which hardens on the bark and surface of the tree. After four or five years the yield is too small to be profitably collected. This gum was formerly distilled dry, but it is now usually distilled with water, from copper stills holding from eight to fifty barrels. The yield of oil is about one-fifth the weight of the gum. The Virgin dip and scrape yield more oil than the later produce of the tree.

The specific characters of oil of turpentine, are given as follows by the British Pharmacopœia—'Limpid, colourless, with a strong peculiar odour which varies in the different kinds of oil, and a pungent and bitter taste. It is soluble in its own weight of glacial acetic acid. It commences to boil at about 160° C., and almost entirely distils below 180° C.—little or no residue remaining.'

Squire's Companion adds the following:—'The specific gravity varies from .860 to .880. French oil is strongly laevorotatory. Oil of turpentine, especially Russian, when exposed to the continuous action of air, in presence of water, develops a large quantity of hydrogen-peroxide, camphoric acid, and other oxygenated products. It dissolves beeswax, iodine, sulphur, phosphorus, fixed oils and resins, with the latter forming varnish. It is soluble in 6.5 volumes of 90 per cent alcohol; in all proportions in absolute alcohol, carbon-bisulphide, chloroform, ether (0.720) and glacial acetic acid.'

The opinions expressed by the public analysts regarding the genuineness of the forty-eight samples of oil of turpentine reported upon in Table 1, of this Bulletin, are

1. Journal Analyt. & App. Chem.—VI, I.—

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based upon a study of the characters enumerated above. The analysts have reported all of the samples as genuine, with exception of two; and in these cases the genuineness is called in question on the ground of want of conformity to B.P. requirements, as follows:—

No. 19837—High gravity, dark colour, high boiling point and large (15) residue on drying, indicate rosin oil.

No. 20867—Low gravity, probable presence of some ingredient having (46) a less density than turpentine.

In addition to corroborating this finding, I have given reason in the sequel for calling in question the genuineness of Nos. 9, 19, 22, 29, 31, 40, and 51.

Commercial oil of turpentine is not a definite chemical substance. When carefully distilled it consists chiefly of *pinene*, $C_{10}H_{16}$; but other terpenes, and products of the oxidation of these are always present. Owing to the readiness with which oil of turpentine undergoes oxidation, in the presence of air and moisture, its composition is continually changing, and for this reason it is not easy to fix numerical constants by means of which the genuineness of a given sample may be judged.

The adulteration of turpentine spirit is no new thing. Materials for effecting this have been made the subject of patents in England and in Germany. (See English patent 12249 granted October 14, 1885,) P. H. Conradson (1) described a so-called 'wood turpentine,' having a specific gravity 0.845 and a flash point below 80° Fah. The most usual adulterant of our time is probably certain fractions of petroleum obtained in the refining of burning oils. In order to disguise their presence, resin oil may be added, or suitable resins (Kaori) dissolved.

In addition to the examination of the samples recorded in Table I, I have done some work on certain petroleum products similar to those which are employed in the sophistication of oil of turpentine, a so-called 'spiritine', a by-product of the refining of wood naphtha, and a sample of resin oil. Since these substances are themselves of very indeterminate composition, it is evident that their presence in a sample of oil of turpentine must be ascertained rather by attention to physical than to chemical properties.

The following list comprises the chief characters which are available for this purpose.

Physical characters:—

1. Colour,
2. Clearness,
3. Odour,
4. Taste.
5. Density,
6. Boiling point,
7. Volatility—presence of a fixed residue,
8. Vapour Density,
9. Flash point,
10. Viscosity,
11. Solubility,
12. Solvent power,
13. Rotatory power for polarised light,
14. Refraction,
15. Fluorescence.

Chemical Characters.—

16. Oxidisability,
17. Bromine Absorption,
18. Rise of temperature with sulphuric acid.

1. *Colour*.—Although recently distilled oil of turpentine is colourless, in thin layers, it has a distinctly yellowish-red tint when viewed through a column of from 20—60cm. After settling quite clear, I find the colour in a 60cm. column to be equivalent to yellow, 5 units + red, 1 unit of the Lovibond scale; and I have not been able to obtain

(1) Journal Soc. Chem. Indus. 1897—519.

any sample with less colour than this. Samples, as purchased, are always much darker. The following numbers are stated for columns of 16 cm., viewed against a strongly illuminated, white wall.

	Yellow.	Red.
No. 7. First 75cc. distilled from 100cc.	0·8	0·1
" 14. The sample	1·0	0·1
" 46. "	1·0	0·1
" 48. "	6·0	1·0
" 51. "	2·0	0·5
" 59. Gasoline	1·0	0·3
" 54. Spiritine	5·0	0·2
Redistilled turpentine + 5 per cent resin oil	20·0	20·0

So far as I know the colour of pure turpentine does not undergo change, if kept in the dark and in air-tight vessels. My experience only covers a period of two months. A sample exposed to sunlight (diffused) has not darkened perceptibly, during a period of one month.

Among the adulterants of turpentine, gasoline is indistinguishable, in this regard, from oil of turpentine, and appears to undergo no change of colour by keeping either in darkness or in sunlight. Spiritine, recently distilled, is nearly as free from colour, but rapidly becomes yellow on exposure to sunlight. The sample quoted above had been exposed to sunlight for two weeks since distillation. Rosin oil gives to turpentine a decided coloration in which red predominates.

Many of the samples which I have examined have been coloured by traces of linseed oil or varnish, due to their having been poured through the same funnels, or stored in the same containers which had been used for these substances. It would perhaps be too much to expect perfect freedom from traces of oil and varnish in the case of oil of turpentine which is avowedly sold for the use of painters. It is evident, however, that such impurity must prevent the colour test from having any value. As applied to the redistilled turpentine sold by druggists, the colour test has a decided value.

2. *Clearness.*—Oil of turpentine is perfectly clear and transparent. A very minute trace of water, if mixed with the turpentine by shaking, suffices to give a distinct turbidity. —Upon standing for some time, most of the water separates, and may be identified by giving a blue colour to anhydrous sulphate of copper. The clear supernatant oil of turpentine is not, however, absolutely anhydrous, and if subjected to distillation, the first portions of the distillate will be found quite turbid—only after 20 or 30 per cent by volume has come over will the distillate become clear. Samples of turpentine distilled from recently fused chloride of calcium come over turbid, and on settling clear the liquid at the bottom of the cylinder gives a blue colour to anhydrous sulphate of copper. It would therefore seem impossible, by any ordinary care, to obtain oil of turpentine perfectly anhydrous. This difficulty may be due to the fact that turpentine in presence of air and sunlight is continually producing hydrogen peroxide, which, by decomposition into oxygen and water, accounts for the traces of water always found in oil of turpentine.

Light petroleum products such as are used to adulterate turpentine, are rendered momentarily turbid by being shaken up with a trace of water, but the water separates in minute droplets almost instantly, so that the difference between oil of turpentine and petroleum is very marked in this respect.

When oil of turpentine containing 10 per cent of gasoline is submitted to distillation, the first fraction comes over quite clear, behaving in this respect quite differently from genuine samples. A faint turbidity appears when about 15 to 20 p. c. volume has passed over, in cases where the amount of the adulterant is not large. No doubt this clearness of the first portions of the distillate is connected with the lowered boiling point of the sample, which causes the water to come over with a fraction very rich in petroleum.

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Although the opacity to which I have referred is largely due to presence of water, I am not convinced that it is altogether due to this cause. The indefinite character of oil of turpentine, and the great number of oxidation products being constantly formed in it when in contact with air and sunlight, make it not unlikely that some of the less soluble products, passing into the distillate, or mechanically carried over with it, may partly explain the opacity referred to.

Another cause of opacity in oil of turpentine is the difference in refractive power possessed by its different components, and by the same component under different conditions of temperature.—Unless very great care be taken to have the whole sample at uniform temperature and thoroughly mixed—it is usually impossible to fill the (20 cm.) tube of the polarimeter so that an immediate reading can be made. A peculiar ‘troubled’ appearance is seen which makes the clear definition of the polariscope field impossible. On allowing the tube to lie at rest for some time, this troubled effect disappears, and very often a peculiar blackness is seen at a point in the top of the field (which as it is inverted, corresponds with the bottom of the tube) caused by the optical disturbance of droplets of water, (or other liquid) which has separated from the sample.

3. *Odour*.—The odour of such of these samples of turpentine as I have reason to believe genuine, is very characteristic and uniform. It is sufficiently strong to disguise effectively the presence of 10 to 20 per cent of gasoline (B. P. 90° C). Higher percentages of gasoline can be detected by its characteristic odour; and, in the first fraction, of one-tenth volume, from a turpentine containing 5 per cent of gasoline, this can be recognized.

Spiritine has a distinct acetone smell, but this is very effectively hidden, up to 20 per cent, by the odour of turpentine.

Rosin oil has a very persistent and characteristic odour of rosin. This is fairly well disguised, up to 10 per cent by that of oil of turpentine, but becomes distinct in the later fractions, and rosin oil constitutes a large part, if not the whole of the residue which is left after the B. P. has reached 210° C.

4. *Taste*.—This property has not been examined.

5. *Density*.—As was to be expected from its indefinite composition, the Density of oil of turpentine is very variable. Pinene, $C_{10}H_{16}$, which is the principal component, has a density 0.858 at 20° C. The oxidation products of turpentine possess a higher gravity than this, H. E. Armstrong¹ is of opinion that pinol hydrate, (which he proposes to name Sobrerol, after Sobrero, who first described it in 1851) is the initial product of the oxidation of turpentine. Pinol hydrate, $C_{10}H_{16}(OH)_2$ is a crystalline substance M.P.—150° isomeric with pinene glycol, another oxidation product of turpentine. Resinous bodies are also among the products of oxidation, and their presence in solution, raises the density of oil of turpentine. Allen² quotes the following densities for pine resin :—

Yellow, transparent = 1.083—1.084.

Whitish, opaque = 1.044—1.047.

Dark, colophony = 1.100.

and for *rosin oil*, 0.980—1.100.

¹Proc. Chem. Soc. 1890, 99; abstracted in the Jour. Soc. Chem. Indus. 1890, 819.

²Commercial Org. Anal. II, 453 and 461.

TABLE II.

SPECIFIC Gravity of Oil of Turpentine, and fraction of 10 p. c. volume.

Temp.=15·5° C.

Serial Number.	Description.	JUNE, 1901.		SEPTEMBER, 1901.		OCTOBER, 1901.	
		Sample.	Fraction.	Sample.	Fraction.	Sample.	Fraction.
1	17330	8672		9472			
2	17331	8691		9418			
3	17332	8687		9560			
4	17333	8694					
5	17785	8673					
6	17787	8674					
7	19492	8704		8991		9007	8688
8	19495	8656		9013			8719
9	19497	8622	8560				
10	19499	8670		8958		8978	
11	19500	8685		9561			
12	19830	8673		8879		8891	8698
13	19833	8678		8965		8980	8669
14	19835	8712	8627				
15	19837	8927	8638				
16	19838	8693		8811		8825	8689
17	19839	8720					
18	19840	8700	8630				
19	19841	8938					
20	19842	8720					
21	19843	8714					
22	19844	8744		8821		8890	8647
23	19845	8682		8819	8641		
24	19846	8664		8717	8641		
25	19847	8672		8839			
26	19848	8678		8745			
27	19849	8703			8694		
28	19850	8691	8639	8931	8630	8944	8684
29	19851	8832		9030			
30	19852	8696		8747	8605		
31	19853	8622	8571	8690	8624		
32	19854	8746		8789	8672		
33	20049	8694					
34	20050	8670	8616				
35	20051	8675		8797		8821	8686
36	20848	8709	8597				
37	20849	8685		8716			
38	20850	8685	8601				
39	20851	8664		9162			
40	20852	8646	8577	9364			
41	20862	8650	8583				
42	20863	8675		8985	8700		
43	20864	8672		9003		9004	8669
44	20865	8683		8794		8798	8650
45	20866	8693		9216		9251	8716
46	20867	8600	8564	8671	8590	8714	8566
47	21579	8692		8969			
48	21582	8658		8849		8859	8666
49	21585	8691		9037		9060	8684
50	21586	8675		8762		8771	8654
51	M	8548	8041	8611	8170	8666	8122
52	Resin oil	9893				9896	
53	Coal oil	7830	7539	7852			
54	Spiritine	8600	8540	8663		8679	8592
55	V	8619		8831			
56	W	8202		8268	8169	8288	

M. A suspected sample of turpentine sent in for examination.
V. Mixed fractions of turpentine boiling at 155° to 156°.
W. A mixture of equal volumes of No. 53 and No. 55.

TABLE II *Concluded.*

SPECIFIC Gravity of Oil of Turpentine, and fraction of 10 p. c. volume.

Temp.=15·5° C.

Serial Number.	Descripti	JUNE, 1901.		SEPTEMBER, 1901.		OCTOBER, 1901.	
		Sample.	Fraction.	Sample.	Fraction.	Sample.	Fraction.
57	X			·8698		·8726	
58	Y			·8873	·8646		
59	Gasoline.			·7289	·7185	·7290	
60	T			·8007	·7412	·8007	·7473
61	S						
62	R					·8808	·8598
63	P					·7462	

- X. and Y. Turpentine samples believed to be genuine.
- T. A mixture of equal volumes of No. 57 and No. 59.
- S. A mixture of turpentines, probably genuine.
- R. A mixture of turpentines, probably genuine.
- P. A substance sold for the purpose of adulterating turpentine.

In the accompanying table (II) I have arranged the observed specific gravities of a number of samples of turpentine oil. The specific gravity was determined in June, immediately after collection of the samples. These were contained in glass bottles of about 12 to 20 ounces capacity. After work upon them had been completed as far as was possible at that time, the samples were placed in a dark cupboard, the bottles being corked, and approximately half full of the sample. After three months it was found that the specific gravity had increased as shown in the columns headed ‘September 1901.’

A third determination of the density, about a month later showed a further increase, in every sample examined, although in this case, the increase is less considerable.

The mean density found in June for 47 samples, is 0·8687. The highest density among these samples is 0·8832 and the lowest is 0·8622. From independent considerations the genuineness of these two samples is questioned.

Thirty-two of these samples were examined after a period of three months, and their mean density was found to be 0·8982, an average increase of 0·0295, or 3·4 per cent. This increase is, however, very different in different samples. The most noted increases are as follows :—

- No. 3—10·05 per cent,
- “ 11—10·08 “
- “ 40 — 8·30 “

In certain samples the increase is slight ; such samples are :—

- No. 12—2·37 per cent.
- “ 16—1·35 “
- “ 22—0·88 “
- “ 24—0·61 “
- “ 26—0·79 “
- “ 32—0·48 “
- “ 37—0·36 “

There is, however, no exception to the fact of increase in weight. The volume of the sample left in each bottle was about 8 ounces. An increase of weight of 3 per cent upon this would mean the absorption of nearly 7 grammes (or 4·9 litres) of oxygen. Since no special precautions were taken in the closing of the bottles, and most of the

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corks had been perforated by a cork-screw, there can be no difficulty in accounting for access of oxygen; but it may be that some of the corks were too closely fitting to permit ready passage of air, so that no certain inferences can be drawn from those cases in which little increase in weight occurred.

If this study had been pre-arranged, I would have taken pains to expose the samples to atmospheric oxygen under defined conditions. The results above tabulated are only of value as showing the very large increase in density which results from oxidation. The maximum specific gravity quoted by Squire (1) 0·880, may be exceeded by a genuine sample as a result of exposure to air for a few months, so that, unless certain conditions of storage are fulfilled, a determination of specific gravity is of limited value in fixing the genuineness of oil of turpentine.

The only sample of Rosin oil (See No. 52) which I examined, had a specific gravity 0·9893 in June, and 0·9896 in October, so that during 4 months, the increase in density was insignificant. It was stored during this interval, in a loosely corked bottle.

Petroleum products likely to be used in turpentine adulteration have a lower density than any of the genuine samples examined. (See No. 53 and 59.) They show but a trifling increase of density, due probably to evaporation of the lighter constituents.

Spiritine shows an increase of density amounting to 0·92 per cent for 4 months. Whether a free exposure to air would effect a greater increase is not known.

It is evident that admixture of petroleum with oil of turpentine would be indicated by a lower density as well as by a lower rate of increase in density through absorption of oxygen. No. 56, a mixture of coal oil and rectified turpentine in equal volumes, illustrates this. During three months the turpentine increased 2·46 p.c.

coal oil	“	0·28	“
mixture	“	0·80	“

Long (2) found 13 samples of oil of turpentine, distilled in his own laboratory, to vary from 0·8622 to 0·8655. With *pure* commercial samples he found the gravity from 0·8656 to 0·8748.

In order to eliminate as far as possible the influence of oxidation upon the samples, I distilled these, and collected apart the first 10 per cent by volume. The mean density of this fraction for 10 samples, presumably genuine, was found to be 0·8600 in June, 1901. (see Table II.) The highest gravity found among these was 0·8639 and the lowest 0·8560. The specific gravity of pinene is 0·858 at 20°C.(3).

In September, I fractioned in the same way, 8 samples, and obtained a mean density of 0·8651 for the first fraction of one-tenth volume.

In October, 5 samples were examined and a mean density of 0·8693 obtained.

The results may be summarized as follows:—

JUNE.		SEPTEMBER.		OCTOBER.	
Samples.	Fraction.	Samples.	Fraction,	Samples.	Fraction.
·8671	·8600	·8811	·8651	·9035	·8693

1. Companion to B. P., 1899, 625.

2. Jour. Analyt. and App. Chem. VI., 2.

3. Richter. Org. Chem., Trans. II, 322.

TABLE III.

DENSITIES OF RESIDUAL FRACTIONS OF ONE-TENTH VOLUME.

Serial Number.	Description.	June.	September.	Remarks.
9	19497	.8639	.....
14	19835	.9665	.....
15	19837	1.0142	.....	Adulterated with resin oil.
18	19840	.8950	.....
21	19843	.8758	.....
24	19846	.....	.9125	
28	19850	.8918	.....
32	19854	.....	.9524	
34	20050	.9502	.....
36	20848	.9265	.....
38	20850	.8891	.....
40	20852	.8849	.....
41	20862	.8724	.....
46	20867	.....	.8973	Probably adulterated.
51	M	.8949	.9416	
54	Spiritine	.8648	.....
60	T	.....	.8852	Mixture turpentine and gasoline.
44	20865	.....	.9660	
59	Gasoline	.....	.7526	

Thus it is seen that although the first fraction of one-tenth volume increases in density, its rate of increase is very much less than that of the whole sample; and a fraction falling well within the limits for turpentine may be obtained from a sample of oil of turpentine which much exceeds these limits.

When a sample is adulterated with gasoline, or other adulterant of low density and boiling point, this constitutes the main part of the first fraction, and the sophistication is clearly indicated by the reduced gravity. See samples 51, 56 and 60.

When the distillation is carried on until 90 per cent of the sample comes over, there is usually left a residue of more or less well-defined brown colour. This contains the resins formed by oxidation, and any rosin oil added as an adulterant. It sometimes happens that the temperature rises considerably above 180° C., before 90 per cent comes over. I have not as a rule carried the distillation beyond 200°, and in a few cases a residue of more than 10 per cent of volume has then remained. In table III. I have given the densities of some of these residues. They are usually characterised by a high index of refraction and a well-marked odour of resin.

6. *Boiling Point.*—The boiling point of pinene is 155° C. Long (1) found the initial B. P. for pure commercial turpentines to be uniformly 155° to 156° C, and 85 per cent distilled over between this temperature and 163° C. He states that the distillation is practically complete below 185° C.

I have read the B. P. when 2 or 3 cc. from 100 cc. had distilled over, and I find this point, in presumably genuine turpentine, to vary from 153° C to 158°, (See Table VII). In most cases the B. P. is 155° to 156°; and it always rises to 155° before 5 per cent of the sample has come over.

The initial temperature of distillation appears to be but little affected by oxidation of the sample.

Rosin oil has an initial B. P. above 200° C.

Spiritine begins to distil at 151° C. The various fractions of petroleum which may, be used to adulterate oil of turpentine, usually have lower boiling points than 150° C. Gasoline (No. 59) begins to distil at 90° C, and 90 per cent of its volume comes over below 114° C.

(1) Jour. Analyt. and App. Chem. VI. 2.

The effect of oxidation is to raise the B. P. of the last fraction. No general conclusions can, however, be drawn as to the rate of this increase, since these samples have not been oxidized under similar or definite conditions. The results, as observed, are summarized below.

Samples.		Initial Boiling Point for last fraction of 10 per cent volume.	
Serial Number.	Description.	June.	September.
7.....	19492	167°	198°
8.....	19495	169°	210
12.....	19830	164°	179
13.....	19833	163°	200°
16.....	19838	168°	170°
28.....	19850	167	195
35.....	20051	163°	186
43.....	20864	164°	201
44.....	20865	164	174
45.....	20866	167°	200
48.....	21582	163°	196
49.....	21585	175°	200
51.....	M	164°	169
54.....	Spiritine....	175°	175°
56.....	W	200°	250°
60.....	T	155°	159
Mean for first 12 samples.		166	192

7. *Volatility*.—When the distillation of a sample of oil of turpentine is pushed to its furthest, there is always found a residuum which cannot be volatilized without decomposition. I find this to be true even in the case of a rectified oil of turpentine. The residue is usually very small, but sometimes amounts to nearly 10 per cent of the sample. This residue is resinous, and an attempt to volatilize it results in a decomposition which is probably analogous to the *cracking* of petroleums. An oil (resin oil) comes over, and a carbonised mass is left in the retort. Decomposition begins soon after a temperature of 210° C. is reached. It would be interesting to carry the distillation of a series of samples to this point, and to ascertain the weight of the residue. This would be a measure of the degree to which resinification had been carried, and might lead to the fixing of a number above which the addition of rosin or rosin oil should be indicated.

Vulpus (1) suggests the evaporation of 1 gramme of a suspected sample side by side with 1 gramme of a pure oil of turpentine, on watch glasses, floated on water kept at 80° C. This test assumes that pure turpentine so treated leaves a fairly constant amount of residue, an assumption which does not agree with my experience. Oxidation proceeds *pari passu* with evaporation, and since different turpentines have very different capacity for taking up oxygen (2) the residual resin must vary in amount. Even with a recently distilled oil of turpentine a decided residue is left on evaporating in an open dish. (See No. 55.) I have found that the conditions under which evaporation is conducted produce so large variation in the result, that unless the process is carried out with strict attention to detail the estimation has little value. If too small a quantity be operated on, the unavoidable variation due to error of experiment becomes relatively great.

The numbers given in the third column of Table IV. were obtained by evaporation of 25 grammes of the sample in a porcelain dish of 4 inch diameter and hemispherical shape. The dish was placed on a water bath, in contact with the water, (which was kept in vigorous ebullition), and was weighed from time to time until the residue ceased to lose more than a few milligrammes in 30 minutes. Even under these condi-

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tions duplicates were not always satisfactory, and in a few cases showed differences of 0.5 per cent when the total residue was less than 2 per cent.

The numbers in the fourth column of Table IV. were obtained by heating 10 grams of the sample, (spread over fibrous asbestos in a large sized Macfarlane tube (3) to 100° C. during 24 hours. I hoped in this way to secure a maximum oxidation and maintained a rapid current of hot air through the oven during the whole time of the experiment. The duplicates were very unsatisfactory, and I was led to conclude that the shape of the tube prevented access of air to the centre of the mass. On using a shallow tube, the numbers in column 5 were obtained, and duplicates were much closer. These percentages, bear no consistent relation to the residue obtained by drying in an open dish; and if they are functions of the capacity of absorbing oxygen from hot air, this fact has not been made clear by a study of other characters.

The numbers given in the next three columns were obtained by treating 10cc. of the sample, absorbed by 3 grammes of loosely packed fibrous asbestos contained in a shallow and wide Macfarlane tube, with a current of air at the ordinary temperature for 48 hours and for a second period of 24 hours. This was followed by exposure in a current of air at 100° C. for 24 hours. The object sought was to obtain a maximum oxidation of the sample under given conditions. The duplicates finally obtained are good. This may indicate that a method of working could be devised which should give some idea of the oxidisability of oil of turpentine, and thus afford a means of ascertaining whether the resinous residue has been produced by oxidation of the sample through long keeping, or has been added as an adulterant in the form of rosin oil. It has not been possible for me to further investigate this subject.

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- (1) Apoth. Zeit, 1891.—6, 289. Abstracted in Jour. Soc. Ch. Indus. 1891, 800.
(2) Kingzett, Jour. Soc. Ch. Indus, 1886, 7.
(3) Analyst, Vol. xvii, 79.

TABLE IV.

Serial Number.	Description.	Residue	Residue	Residue	10cc. in Short tubes with 3 grms. Asbestos for successive periods of			Duplicates.
		evapora- tion in open dish. at 100° C.	Mac farlane tubes - large 24 hrs. 100° C.	using Short tubes.	48 hrs. Cold.	24 hrs. Cold.	24 hrs. Hot.	
1	17330	2·864	21·14					
2	17331	1·064	21·21	17·30	32·02	23·66	6·30	= { 6·39 6·31
3	17332	1·348	26·64					
4	17333	1·388	22·08					
5	17785	0·816	17·60					
6	17787		11·73					
7	19492	1·490	18·06	12·50	18·99	11·78	4·60	= { 4·53 4·68
8	19495	1·360						
9	19497		23·00					
10	19499	1·196		9·40	18·80	10·25	3·63	= { 3·45 3·81
11	19500	1·436	22·20					
12	19830	1·896		6·65	11·10	4·84	2·00	= { 2·14 1·87
13	19833	1·016						
14	19835	1·932						
15	19837	5·988	31·70	22·22	40·37	32·71	12·16	= { 12·01 12·30
16	19838	1·324						
17	19839	1·654						
18	19840	0·948						
19	19841	2·584	22·25					
20	19842	1·680						
21	19843	1·920						
22	19844	3·032						
23	19845	1·304						
24	19846	0·572						
25	19847	0·636						
26	19848	1·488						
27	19849	1·320						
28	19850	0·764						
29	19851	5·024		13·25	32·81	23·50	7·46	= { 7·46 7·46
30	19852	1·456						
31	19853	0·732						
32	19854	3·340						
33	20049	1·272						
34	20050	0·816						
35	20051	0·872		6·58	16·52	7·64	2·78	= { 2·60 2·97
36	20848	1·564	21·00					
37	20849	1·962	21·40					
38	20850	1·168						
39	20851	1·036						
40	20852	2·352						
41	20862	1·280						
42	20863	1·140						
43	20864	0·928						
44	20865	1·220						
45	20866	1·508		12·56	26·87	13·50	4·64	= { 4·48 4·80
46	20867	1·250		6·56	14·77	7·67	1·83	= { 2·01 1·65
47	21579	1·296						
48	21582	0·468						
49	21585	0·980		12·32				
50	21586	1·542		8·51	18·88	8·74	2·78	= { 2·69 2·87
51	M (1)	1·280						
52	Resin oil.	95·980						
53	Coal oil.	10·272						
54	Spiritine.	1·400		7·42				
55	V (1)	2·400						
56	W (1)	7·268						
57	X (1)							
58	Y (1)							
59	Gasoline.	0·004						
60	T (1)							
61	S (1)							
62	R (1)	3·912						
63	P (1)	0·296						

(1). See explanatory note to Table II.

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Petroleum products of low boiling point volatilize completely without oxidation. When the B.P. of the petroleum adulterant is high, a large residue is left (see No. 53) but this is of an oily character, not resinous ; and when obtained in asbestos, is easily washed out with petroleum ether.

I think that determinations of vapour tension, made with an instrument on the same principle as Geissler's well known vaporimeter, might give useful indications, but I have not found time to investigate this point.

8. *Vapour Density*.—The molecular weight of pinene, $C_{10}H_{16} = 136$ corresponds to a vapour density of 68 (Hydrogen = 1), or 4.72 (air = 1). That of the paraffins which are generally used to adulterate oil of turpentine corresponds to a V.D. of about 57 (or 3.96). For a petroleum benzine distilling between 80° and 150° , Long (1) obtained a V.D. = 4.09. For a fraction of oil of turpentine distilled at 156° he obtained V.D. = 4.67 ; while fifteen commercial samples gave V.D. from 4.80 to 5.11.

I have repeatedly attempted the determination of the vapour density of oil of turpentine with Victor Meyer's apparatus, using methyl salicylate as a bath, but without satisfactory result. The temperature of boiling methyl salicylate (224° C.) is not high enough to secure the complete vaporisation of oil of turpentine. I have also tried a bath of Rose's metal kept as nearly as possible at 300° C. The results are better, but are not such as to justify expectation of the method proving available in assay work ; at least until the glass vessel shall have been replaced by something less fragile. I am now experimenting in this direction, but results are yet too incomplete to justify publication.

9. *Flash Point*.—The usual flash point for oil of turpentine, according to Long, is 32° C. He used a Stoddard apparatus. (2).

Most of the petroleum products used to adulterate turpentine have a lower flashing point. Conradson (3) describes a so-called 'wood turpentine' having a flash point below 27° C. The following numbers have been obtained with Abel's well-known apparatus.

Serial Number.	Description.	Flash Point.
—	Turpentine spirit	32°
62	“ “ R	32°
57	“ “ X	28°
53	Coal oil.....	35°
59	Gasoline.....	20°
60	Mix turpentine and gasoline.....	23°
51	Sample M.....	26°

The flash point is apparently a valuable indication of the presence of low boiling petroleum adulterants. It would, however, fail to detect mineral oils of flash test above 32° C—such as the ordinary burning oils (kerosene).

10. *Viscosity*.—The viscosity of a sample of oil of turpentine having a sp. grav. 0.8710 at 12° C. was found by E. J. Mills to be 177.48 (water = 100 (1)).

(1) Jour Analyt. and App. Chem. VI.

(2) American Chem. Jour. -4, 287

(3) Jour. Soc., Chem. Indus. 1897, 519.

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The following determinations of viscosity were made with a viscosimeter which I designed in 1894. (2). A cylindrical nozzle of $\frac{1}{32}$ inch diameter was used.

Sample.	Temp. 20° C.	
	Seconds for 50 cc.	Ratio.
Water.....	128.5	1.000
(S. g. 785) Coal Oil (No. 53).....	181.0	1.408
(S. g. 729) Gasoline (No. 59).....	114.0	0.887
T (No. 60).....	126.5	0.984
Turpentine.....	157.5	1.226
“ + 5 % Resin oil.....	166.0	1.291
“ + 10 % “.....	172.0	1.338
M. (No. 51).....	153.0	1.191

No. 60 is a mixture of equal volumes of genuine turpentine with gasoline. It is evident from the above results that the admixture of a low gravity petroleum with turpentine could be detected by the change in viscosity. Also, that a mixture of petroleum could easily be prepared having the same viscosity as oil of turpentine. Since mineral oil is not chemically affected by contact with air, it is probable that a study of the change in viscosity produced by aspirating a current of air through turpentine (under conditions which should prevent loss by volatilization) might be made a simple and reliable means of detecting adulteration with petroleum products.

11. *Solubility*.—The solubility of oil of turpentine in glacial acetic acid is usually regarded as demonstrating the absence of petroleum. Care must be taken in using the test, for the following reasons:—(1) The presence of a very small amount of water suffices to determine the separation of the liquids. Hence, many commercial samples of glacial acetic acid fail to mix with oil of turpentine. (2) Petroleum of B. P. 150° to 200° C. may be present to the extent of nearly 50 per cent without affecting the solubility of oil of turpentine in glacial acetic acid. Light petroleum is easily separated by fractioning, and the test may be applied to the fraction boiling below 150° C.

Rosin oil and spiritine are both quite miscible with glacial acetic acid.

12. *Solvent Power*.—I have examined the relative solvent power of spirit of turpentine and of certain adulterants for asphaltum in the following way: 10cc. of the sample is poured upon 1 gram of powdered asphaltum in a test tube and shaken at intervals for an hour. 1cc. of the resulting solution is filtered into a second tube, and the filtrate is diluted with 10 to 15cc. of the sample until a transparent solution is obtained. When genuine turpentine is treated in this way, it is found that a much darker solution is obtained than when petroleum is present, owing to the greater solvent power of turpentine. An approximate estimation of the quantity of mineral oil adulterant may be made by noting the relative depth of colour.

The process has been tested upon the following samples with the results given.

Serial No.	Description.	Intensity of colour.	Remarks.
46	20867.....	Very black.....	Doubtful sample.
51	Genuine.....	“ “.....	Pure.
63	M.....	Much lighter.....	Doubtful sample.
59	P.....	“ “.....	Surrogate.
53	Gasoline.....	“ “.....	Petroleum.
	Coal Oil.....	“ “.....	“

(1) Journal of the Society of Chem. Indus. 1886, 149.
(2) Canadian Record of Science, 1894, 153 and transactions Roy. Soc. of Can. 1895, p. 97.

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13. *Rotatory power for polarised light.*—Kingzett (1) asserts that the oxidisability of oil of turpentine and its capability of producing hydrogen peroxide varies much in different samples. Those having a high rotatory power are most marked in this regard, next coming those of very low rotation. He claims that American oil of turpentine is not readily oxidisable, and is not a prolific source of peroxide of hydrogen. H. E. Armstrong holds (2) that there are two terpenes (dextro and lævoterebenthene) represented by the essential components of French and Burmese oil of turpentine respectively, and that American and other turpentines are mixtures of these.

J. H. Long (3) finds American oil of turpentine to vary through wide limits in its rotatory power. He is of opinion that the presence of small quantities of the resin from *Pinus palustris*, which is strongly lævorotatory

$$\left([\alpha]_D = -34.83 \right)$$

may account for the left-handed rotation of many American samples. He notes the following peculiarities: 'After carefully fractionating distilled turpentine, the first portions possess a higher, both + and — rotation than the last portions. The lower rotation of the last fractions is probably not due to the presence of oxygenated bodies. Exposure to light appears to increase the specific rotation. In one case it did so from 16.15° to 17.08° in 50 days. Combination with oxygen during exposure to air increases the rotation. In one sample, air at 90° C. passed through for 55 hours, changed the rotation from 9.79 to 13.56 .'

My results with these samples are stated in Table V. The readings made in June were made in a 20 cm. tube, using sodium light. The polarimeter was graduated in circular degrees, and the specific rotation is calculated by the usual formula—

$$[S]_D = \frac{100 a}{2 \times sp. grav.}$$

The later readings were made with a triple field instrument of Schmidt & Haensch new pattern. I find that the solution of bi-chromate of potash recommended as a light filter (the white light of a small incandescent electric lamp is employed) is less satisfactory with turpentines than a solution of fuchsin red, (0.2 gramme per 100cc. water) which gives a very evenly lighted field. The scale is graduated in sugar degrees, and the specific rotation for this light is calculated by the formula—

$$[S]_R = \frac{.352 \times a}{2 \times sp. grav.} = \frac{.176a}{sp. grav.}$$

The factor .352 was determined by reading a series of samples in both instruments, using the sodium flame for the circular polarimeter. The numbers obtained are therefore comparable with each other.

Of 51 samples of oil of turpentine examined, 5 proved to be lævorotatory. The effect of keeping these samples in loosely corked bottles for three months has been to reduce the specific rotation in the three lævorotatory samples which were examined at both dates.

Of the samples exhibiting dextro-rotation, only 9 show any marked reduction of rotatory power by keeping; 5 show a decided increase, and 11 are but little changed in this regard.

The specific rotation of the first distillate of $\frac{1}{10}$ volume is always higher than that of the sample; and this agrees with Long's observation.

(1) Jour. Soc. Ch. Indus., 1886-7.

(2) Proc. Chem. Soc., 1890, 99.

(3) Jour. Analyst and App. Ch., VI, 1.

TABLE V.
SPECIFIC Rotation [S] $\frac{D}{20}$ for Oil of Turpentine.

Serial No.	Descrip- tion.	THE SAMPLE.		FIRST FRACTION OF $\frac{1}{10}$ VOLUME.		LAST FRACTION OF $\frac{1}{10}$ VOLUME.	
		June.	Sept.	June.	Sept.	June.	Sept.
1	17330	-16.95	- 8.06				
2	17331	+15.53	+12.33				
3	17332	+16.46	+11.04				
4	17333	+ 5.00					
5	17785	+ 9.40					
6	17787	+ 9.07					
7	19492	+12.06	+12.13	.....	+16.11		
8	19495	+ 4.23	+ 5.47	.....	+ 7.47		
9	19497	+14.78					
10	19499	+11.96	+12.18				
11	19500	+14.01	+10.41				
12	19830	-16.43	-14.19	.....	-15.26		
13	19833	+13.68	+14.29	.....	+18.68		
14	19835	+13.67					
15	19837	+14.16					
16	19838	+ 4.17	+ 4.95	.....	+ 7.74		
17	19839	- 4.87					
18	19840	-11.21					
19	19841	+11.35					
20	19842	+ 1.15					
21	19843	+15.63					
22	19844	+14.5	+13.95	.....	+18.65		
23	19845	+14.22	+14.07				
24	19846	+14.41					
25	19847	+ 5.94	+ 6.85				
26	19848	+15.55	+15.51				
27	19849	+ 4.30	.....	.....	+ 7.09		
28	19850	+11.72	+12.77	.....	+16.88		
29	19851	+12.45					
30	19852	+16.09	+14.97				
31	19853	-13.77	-12.92				
32	19854	+13.95	+14.22				
33	20049	+13.79					
34	20050	+17.12					
35	20051	+14.12	+13.12	.....	+16.92	.....	+ 1.37
36	20848	+14.06					
37	20849	+ 2.44	+ 1.68				
38	20850	+ 0.92					
39	20851	+ 3.31					
40	20852	+ 1.01	+ 2.97				
41	20862	+13.15					
42	20863	+12.10			+15.18		
43	20864	+13.83	+13.87	.....	+18.37		
44	20865	+12.98	+12.87	.....	+15.91		
45	20866	+12.59	+12.03	.....	+17.60		
46	20867	+13.57	+12.46	.....	+15.94		
47	21579	+16.87	+16.52				
48	21582	+17.03	+16.80	.....	+20.92		
49	21585	+12.99	+12.93	.....	+17.35		
50	21586	+15.37	+15.54	.....	+19.44	.....	+ 7.67
51	M (1)	+10.55	+ 8.79	.....	+ 9.19		
52	Resin oil.						
53	Coal oil.	+ 0.00	+ 0.06				
54	Spiritine.	+11.45	+11.74	.....	+14.54	.....	+ 3.95
55	V (1)	.....	+12.04				
56	W (1)	.....	+ 4.77	.....	+ 7.89		
57	X (1)	.....	+11.49				
58	Y (1)	.....	+ 1.38	.....	+ 3.32		
59	Gasoline.	.....	+ 0.12	.....			+ 0.28
60	T (1)	+ 6.55	+ 3.70	+ 6.98
61	S (1)						
62	R (1)	-11.59	+13.61		
63	P (1)	- 0.35				

(1). See explanatory note at foot of Table II.

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The rotation of the last fraction of one-tenth volume has only been read in the cases of two presumably genuine samples (Nos. 35 and 50). In these, as well as in the residual tenths from 54, 59 and 60, the specific rotation is very low. This also agrees with the results found by Long. Owing to the brown colour of this residue it is difficult to read the rotation even in a 1 dm. tube.

It is usually assumed that a low specific rotation indicates the presence of a petroleum or other not optically active adulterant. From the fact, however, that lævorotatory samples are by no means infrequent (such samples make up 10 per cent of those herein reported) it is evident that a mixture of these with the dextrorotatory kind would lower the observed rotation, and might even produce a non-optically active mixture.

Spiritine has the same dextrorotation as an ordinary turpentine oil.

Aignan (1) states that the presence of resin-oil in turpentine is easily detected by the change in rotatory power, especially when a residual fraction is used in the experiment. This is doubtless true of French oil of turpentine, which is lævorotatory—but it altogether fails with American turpentine.

The determination of optical activity does not appear to have any value for analytical purposes. Except in so far as a high rotation either + or — is an indication of genuineness.

14. — INDEX OF REFRACTION.

This has been determined by the use of the Abbe-Zeiss Refractometer of the older form, and not furnished with prism casings. Since changes of temperature greatly affect the readings, and the instrument is not easily maintained at any other temperature than that of the room, I have found it advisable to determine a correction factor, and have adopted ± 0.0005 for 1° C. (See Table VI.) The readings have all been made within a few degrees of 20° C., and have been corrected to this temperature by the above factor. The correction is additive for temperatures above and subtractive for temperatures below 20° C.

. The instrument was adjusted to read 1.3330 for water at 20° C.

(1) Comp. Reud. 124, 1367.

TABLE VI.

CORRECTION of Refractive Index for Temperature.

(Abbe's Refractometer.—The scale readings give three decimal figures ; the fourth decimal is estimated by the observer.)

	No.	Temperature of Observation.	Observed Index of Refraction.	Difference for each 1° C.	Remarks.
Whole samples of turpentine.....	17	31°	1·4687	} ·00051	The mean value for a difference of 1° C. is 0·000547.
		18°	1·4753		
	21	28°	1·4680	} ·00051	
		18°	1·4731		
	58	32°	1·4658	} ·00062	
		18°	1·4745		
First fraction of one-tenth volume.	29	15°	1·4715	} ·00050	The mean value for a difference of 1° C. is 0·000437.
		18°	1·4700		
	31	16°	1·4703	} ·00033	
		19°	1·4693		
	42	21°	1·4684	} ·00048	
		17°	1·4703		
Last fraction of one-tenth volume.	29	18°	1·5·04	} ·00060	The mean value for a difference of 1° C. is 0·000477.
		15°	1·5222		
	31	20°	1·4845	} ·00033	
		16°	1·4858		
	42	20°	1·5055	} ·00050	
		17°	1·5070		

The average value for a difference of one degree centigrade is therefore 0·00049. A slightly higher value is observed in whole turpentines, and a somewhat lower value in the fractions obtained on distillations. I have adopted the uniform correction, 1° = ± ·0005, and when the reading is made at a temperature but a few degrees removed from 20° C., only a negligible error can result by using this constant.

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TABLE VII.

REFRACTIVE INDICES of Oil of Turpentine, at 20° C.

A. Observed in June, 1901.

B. Observed in September, 1901.

Serial No.	Description.	Letter of Reference.	REFRACTIVE INDEX.			Difference.	Boiling Point.
			The Sample.	First Fraction of $\frac{1}{10}$ Volume.	Residue of $\frac{1}{10}$ Volume		
1	17330	A	1.4684	1.4677	1.4790	0.0113	155°-164°
		B	1.4797		1.5111		157°
2	17331	A	1.4681	1.4622	1.4757	0.0095	153°-162°
3	17332	A	1.4682	1.4672	1.4806	0.0134	153°-164°
4	17333	A	1.4688	1.4675	1.4783	0.0108	154°-166°
5	17785	A	1.4678	1.4660	1.4816	0.0156	156°-164°
		B	1.4818				
6	17787	A	1.4682	1.4669	1.4837	0.0168	156°-164°
7	19492	A	1.4684	1.4660	1.4851	0.0191	155°-167°
8	19495	A	1.4685	1.4666	1.4859	0.0193	155°-169°
		B		1.4692			156°-210°
9	19497	A	1.4667	1.4648	1.4670	0.0022	154°-180°
		B	1.4830				
10	19499	A	1.4678	1.4656	1.4751	0.0095	153°-165°
11	19500	A	1.4679	1.4668	1.4852	0.0184	155°-164°
12	19830	A	1.4697	1.4676	1.4779	0.0103	155°-164°
		B	1.4754	1.4706	1.5153	0.0447	156°-179°
13	19833	A	1.4681	1.4662	1.4777	0.0115	156°-163°
		B		1.4695	1.5164	0.0469	156°-200°
14	19835	A	1.4686	1.4665	1.4942	0.0277	155°-170°
15	19837	A	1.4726	1.4674	1.5049	0.0375	158°-200°
16	19838	A	1.4688	1.4664	1.4793	0.0129	156°-168°
17	19839	A	1.4722	1.4689	1.4832	0.0143	156°-167°
		B	1.4741				
18	19840	A	1.4721	1.4689	1.4810	0.0121	156°-165°
		B	1.4749				
19	19841	A	1.4751	1.4674	1.5138	0.0464	154°-200°
20	19842	A	1.4716	1.4684	1.4842	0.0158	157°-172°
		B	1.4729				
21	19843	A	1.4706	1.4668	1.4803	0.0135	155°-164°
		B	1.4712				
22	19844	A	1.4729	1.4673	1.4939	0.0266	154°
		B	1.4730	1.4692	1.5080	0.0388	154°-175°
23	19845	A	1.4705	1.4666	1.4842	0.0176	155°-170°
		B	1.4720	1.4697	1.5023	0.0326	155°
24	19846	A	1.4703	1.4669	1.4726	0.0057	156°-166°
		B	1.4707	1.4694	1.4853	0.0159	
25	19847	A	1.4702	1.4668	1.4756	0.0088	157°-165°
		B	1.4724				
26	19848	A	1.4705	1.4663	1.4790	0.0127	156°-166°
		B	1.4716	1.4693	1.4912	0.0219	
27	19849	A	1.4714	1.4670	1.4795	0.0125	155°-167°
		B	1.4740	1.4695	1.5119	0.0424	
28	19850	A	1.4707	1.4670	1.4787	0.0117	155°-167°
		B	1.4733	1.4698	1.4980	0.0282	155°-195°
29	19851	A	1.4725	1.4668	1.5322	0.0354	154°-179°
		B	1.4755	1.4690	1.5195	0.0505	
30	19852	A	1.4704	1.4670	1.4785	0.0115	156°-170°
		B	1.4719	1.4687	1.4900	0.0213	157°
31	19853	A	1.4682	1.4659	1.4676	0.0017	158°-185°
		B	1.4700	1.4685	1.4840	0.0155	
32	19854	A	1.4707	1.4660	1.4887	0.0227	155°-168°
		B	1.4716	1.4697	1.4943	0.0246	156°-168°
33	20049	A	1.4713	1.4661	1.4825	0.0164	155°-165°
34	20050	A	1.4673	1.4660	1.4780	0.0120	156°-162°
35	20051	A	1.4694	1.4667	1.4817	0.0150	155°-163°
		B		1.4683	1.5085	0.0402	155°-186°
36	20848	A	1.4685	1.4661	1.4893	0.0232	155°-170°
		B	1.4708	1.4699	1.4990	0.0291	155°

TABLE VII—Continued.

REFRACTIVE Indices of Oil of Turpentine, at 20° C.—Concluded.

No.	Description.	Letter of Reference.	REFRACTIVE INDEX.			Difference.	Boiling Point.
			The Sample.	First Fraction of $\frac{1}{10}$ Volume.	Residue of $\frac{1}{10}$ Volume.		
37	20849	A	1.4688	1.4650	1.4873	0.0223	155°-165°
38	20850	A	1.4701	1.4673	1.4787	0.0114	.....
39	20851	A	1.4704	1.4670	1.4800	0.0130	155°-165°
		B	.....	1.4717	.....	.....	155°
40	20852	A	1.4672	1.4659	1.4758	0.0099	157°-174°
41	20862	A	1.4666	1.4657	1.4712	0.0055	155°-175°
		B	1.4695	.....	.....	.....	.....
42	20863	A	1.4706	1.4667	1.4843	0.0175	154°-166°
		B	1.4755	1.4688	1.5055	0.0367	156°
43	20864	A	1.4697	1.4660	1.4764	0.0104	155°-164°
		B	1.4763	1.4717	1.5148	0.0437	155°-201°
44	20865	A	1.4696	1.4663	1.4805	0.0142	155-164
		B	.....	1.4694	1.4985	0.0291	156-174
45	20866	A	1.4706	1.4659	1.4819	0.0160	155°-167°
		B	1.4816	1.4701	1.5196	0.0495	156°-200°
46	20867	A	1.4651	1.4625	1.4626	0.0001	155-180
		B	1.4685	1.4658	1.4780	0.0122	.....
47	21579	A	1.4710	1.4662	1.4787	0.0125	156°-167°
48	21582	A	1.4688	1.4665	1.4743	0.0078	156-163
		B	1.4749	1.4696	1.5091	0.0395	156°-196°
49	21585	A	1.4700	1.4661	1.4857	0.0196	155°-175°
		B	.....	1.4689	1.5150	0.0461	155°-200°
50	21586	A	1.4692	1.4670	1.4796	0.0126	155°-170°
		B	1.4723	1.4691	1.4919	0.0228	.....
51	* M	A	1.4627	1.4437	1.4759	0.0322	134°-164°
		B	1.4679	1.4466	1.4951	0.0485	.....
52	Resin oil	A	1.5398	.....	.....	.....	200°+
53	Coal oil	A	1.4341	.....	.....	.....	171°-200°+
54	Spiritine	A	1.4701	1.4654	1.4788	0.0134	151°-175
		B	1.4722	1.4698	1.4891	0.0193	154-175
55	V	A	1.4763	.....	.....	.....	155°-156°
56	* W	A	1.4507	1.4506	1.4562	0.0056	154°-200°+
		B	1.4538	1.4494	1.4565	0.0071	154°-250°+
57	* X	A	1.4700	1.4660	1.4733	0.0073	.....
58	Y	A	1.4737	1.4696	1.4985	0.0289	157°-172°
59	Gasoline	A	1.4068	1.4033	1.4231	0.0198	90-114
60	T	A	1.4398	1.4178	1.4770	0.0592	93°-155°
62	R	A	1.4733	1.4647	.....	.....	155°-174°
63	* P	A	1.4175	.....	.....	.....	.....
	Water		1.3330	.....	.....	.....	.....

See explanatory note at foot of Table II.

The mean index of refraction for 42 samples of oil of turpentine is 1.4694 at 20° C. The extremes among these samples are 1.4667 and 1.4722. It is matter of observation that wherever these numbers have been exceeded, the sample has been found to be suspicious upon other grounds.

The refractive index of rosin oil is so much higher than that of oil of turpentine, that the admixture of a few per cent causes a notable rise. At the same time, it is evident that the resinous bodies which result from atmospheric oxidation of the turpentine act like rosin oil in this respect. These are for the most excluded from the first fraction of one-tenth volume, and the refractive index of this fraction shows a remarkable uniformity. It may be taken as averaging 1.4670 when distilled from a newly opened barrel of turpentine; and when distilled from a sample long exposed to the air, it rarely exceeds 1.4700.

I had hoped to be able to make use of the difference between the refractive indices of the first fraction, and the residual tenth, but this number varies so much in consequence of the ageing of the sample, that it does not appear to be available for

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analytical purposes. The absolute magnitude of the refractive index for the residual tenth is a good indication of the extent to which the sample has undergone oxidation, or to which rosin oil, or similar adulterant of high specific refraction, has been added. In genuine samples, which have not been unduly exposed to air, it should apparently not exceed 1.4850. The difference between the refractive indices of the first and last fractions of normal samples is therefore about 0.0180. There are, however, several notable exceptions among the samples tabulated (see Nos. 9, 31 and 46) and it is worthy of remark that, although two of these samples are passed as probably genuine upon the whole results of analysis, their specific gravity is exceptionally low. The indications of the difference column must evidently be interpreted in conformity with the reading of the first fraction. Where this is abnormally low, (see No. 59) the number in the difference column considered by itself, may be misleading.

Spiritine (No. 54) behaves very like turpentine in regard to refraction. Other adulterants are characterised by much higher (rosin oil) or much lower refraction numbers. (See 53, 59, 63.)

15. *Fluorescence*.—I have not been able to make the fluorescence of petroleum serviceable for its detection or estimation in presence of oil of turpentine. Mr. Kenrick has recorded a blue fluorescence in samples 17330, 17331, 17332, 17333. These samples he considers genuine.

16. *Oxidizability*.—The property of taking up atmospheric oxygen with the formation of resinous products of higher gravity and boiling point than oil of turpentine itself, naturally affects the sample in these two particulars, as has already been mentioned under Sections 5, 6 and 7. Engler (2) states that half of the oxygen at first absorbed is in the active condition, and subsequently performs intramolecular oxidation.

The ready polymerization and conversion of oil of turpentine into soluble compounds under the influence of strong sulphuric and nitric acids has been proposed for the quantitative separation and estimation of petroleum adulterants which are but little influenced by these oxidants.

The use of sulphuric for this purpose seems to have been suggested by H. E. Armstrong (1.) The sample is treated with sulphuric acid and the portion unacted upon is distilled off in a current of steam. This is treated a second time, and, if necessary, a third and fourth time, till the acid has no further effect upon the material. I have found the process fairly satisfactory, but very tedious, and not suited for the practical examination of commercial samples, where time is a consideration.

Oxidation by fuming nitric acid has been proposed by Burton (1.) In my hands it has not proved a success. If the temperature be allowed to rise, there is certainty of loss of material, and if it be kept down, as recommended, by immersion of the decomposing flask in water, the reaction does not occur with regularity or certainty, and the addition of turpentine cannot be regulated so as to prevent violent and dangerous explosions. It may be that further experience would overcome these difficulties. The method has been approved by Long and others.

My attempts to bring about atmospheric oxidation under fixed and constant conditions are described in Section 7.

17. *Bromine Absorption*.—F. Evers (1) proposes the decolorization of bromine water by oil of turpentine as a way of distinguishing it from mineral adulterants.

Schreiber and Zetzsche (2) improve upon this suggestion by modifying the details of the process, as follows :—

The sample is prepared by dissolving 1cc. in 49cc. alcohol (90—95 per cent.)

Solution (3.)—Bromide of potassium 50 grammes and bromate of potassium 15 grammes, in 1 litre of water.

Solution (4.)—Dilute sulphuric acid, 1:3.

20cc. of the prepared sample is treated with 20cc. of each solution, and the mixture shaken for half a minute, the temperature being kept as near 20° C. as possible.

(1.) Jour. Chem. Soc., 1890, 99.

(2.) Abst. in Jour. Soc. Chem. Indus. 1900, 682.

(1.) Amer. Chem. Jour., 12, 102.

(3.) Chem. Centralb., 1898, 865.

(4.) Chem. Zeit., 189 686. Abstracted in Jour. Soc. Chem. Indus., 1899, 949.

Genuine spirit of turpentine decolorizes this solution.

I have found this to work fairly satisfactorily with four samples of genuine turpentine spirit. The decoloration was complete in one case, and nearly so in the others. Coal oil, gasoline and rosin oil, failed to decolorize the bromine solution. Oil of turpentine with 20 per cent of coal oil was easily distinguished from the unadulterated article; but 10 per cent coal oil gave only a doubtful indication.

18. If oil of turpentine be mixed with about 4 volumes of a mineral oil (coal oil) the addition of strong sulphuric acid produces little or no charring, and the rise of temperature is gradual. In the following experiments, 10cc. of strong sulphuric acid was added with constant stirring, to a mixture of 10cc. turpentine with 40cc. of ordinary kerosene (coal oil). The beaker containing the turpentine mixture was placed in a larger beaker, the intervening space being filled with fibrous asbestos.

The coal oil used to dilute the turpentine was found to produce a rise of 3.4° C. on mixing 50cc. with 10cc sulphuric acid. Two samples of turpentine gave (a) 57° (b) 57° mean=57° C. and (a) 54.8 (b) 52.9 mean=53.9°—while the sample, No. 63 of the tables, gave (a) 10.9 (b) 10.4, mean=10.7° C.

The initial temperature was, in each experiment, nearly that of the room. Further investigation of this test will be made.

SYNOPSIS of results pointing to adulteration.

Character.	Serial Number of Sample.																			
	1	9	12	13	14	15	16	19	22	29	31	32	34	36	40	41	44	45	46	51
Colour abnormal.....																				
Clearness of first fraction.....																				
Odour abnormal.....																				
Density abnormally low in sample..																				
Density abnormally high in sample..																				
Density abnormally low in fraction..																				
Density abnormally high in residue..																				
Boiling point abnormally low.....																				
high.....																				
Residue abnormally high.....																				
Flash point abnormally low.....																				
Viscosity ratio low.....																				
Solubility in acetic acid in complete.....																				
Index of refraction high....																				
low ..																				
Summary.....	1	3	1	1	1	6	1	4	2	5	4	1	1	1	3	1	1	1	4	8

In the accompanying synopsis I have arranged the results of my tests as applied to the samples collected. It will be seen that 9 samples give abnormal indications in regard to two or more characters. The identifying numbers are as follows :—

Serial Numbers.	Description.	Remarks.
9	19,497	Probably contains petroleum.
15	19,837	Contains rosin oil.
19	19,841	Probably contains rosin oil.
22	19,844	May contain rosin oil.
29	19,851	Probably contains rosin oil.
31	19,853	May contain petroleum.
40	20,852	" "
46	20,867	Contains mineral oil.
51	M	" "

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It occurred to me that the determination of the heat of combustion might furnish numbers which would have value in discriminating between genuine and adulterated turpentine. My friend Dr. H. C. Sherman of Columbia College, New York, was good enough to determine (with the bomb calorimeter) the calorific values for three samples, viz.:—

No. 53—(Coal oil).....	(a)	11168
	(b)	11176
	(c)	11198

Mean = 11184 calories per gram at constant volume.

No. 54—(Spiratine).....	(a) 10568
	(b) 10546

Mean = 10557 calories per gram at constant volume.

No. 55—(Genuine turpentine) ..	(a) 10813
	(b) 10788

Mean = 10801 calories per gram at constant volume.

The comparatively small differences shown make it very doubtful whether useful indications could be obtained. It may be possible at some future time to further investigate this subject.

The following is an attempt to define oil of turpentine on the basis of the work just recorded. The definition must be regarded as provisional, and subject to correction and amplification.

Oil of turpentine is a liquid, *colourless* in thin layers, and having a *yellow-red* tint, equivalent to about 1 unit of yellow and 0.1 unit of red (Lovibond scale) when viewed in a column 2 dm. long. *Clear*, but made decidedly opaque by shaking with 0.1 per cent water, and giving an *opaque distillate* of one-tenth volume, which settles clear in a few hours. *Odour* peculiar and characteristic, quite distinct from that of gasoline, rosin oil or acetone, and capable of disguising these odours to the extent of 10 per cent admixture. *Density* between 0.860 and 0.880, (usually about 0.870)—but samples which have been long exposed to air may have a higher density. The *first fraction* of one-tenth volume, has a density between 0.856 and 0.870 (usually about 0.860). The *residual tenth* should not exceed 0.900. The *Boiling point* should lie between 154° and 158° C., and nine-tenths should distil below 180° C. The *fixed residue*, on evaporating over boiling water in a 4 inch, hemispherical dish, should not exceed 2 per cent. The *viscosity*, at 20° C., should be nearly 1.230 (water = 1.000)—McGill viscosimeter. *Flash point* should be about 32° C.—(Abel instrument.)—Should *dissolve* completely in an equal volume of glacial acetic acid, and the first fraction should similarly dissolve. A *saturated solution* of asphaltum should not be rendered translucent by dilution to ten volumes. (This test is best made by comparison with a sample of known purity.) The *optical activity* of the first fraction should increase in a + direction by oxidation. The *refractive index* at 20° C. should lie between 1.4667 and 1.4722. That of the first fraction should not exceed 1.4700. Moistened iodide of starch paper should become blue when suspended over turpentine exposed to air. *Free Bromine* in solution (see Section 17) should be decolorized. *Strong sulphuric acid* should polymerize and char the sample at a boiling temperature. A *rise of temperature* (see Sec. 18), should result on mixing with sulphuric acid.

NOTE.—I may mention that an investigation is now being carried on with a view to utilizing the specific heat of oil of turpentine as a means of determining its purity. There is a sufficient difference between the specific heat of oil of turpentine and that of hydrocarbons of the paraffin series, to make this determination available, if a sufficiently simple and yet accurate apparatus could be devised for carrying it out.

A. MCGILL

APPENDIX H.

BULLENTIN No. 80.—MILK.

OTTAWA, December 20, 1901.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—In the months of September and October last, in accordance with the instructions issued by you to the food inspectors, a collection of milk samples was made in various localities throughout the Dominion, and I have now to report to you the results of the examination of these. There were obtained in all 182 samples at the places detailed in the following list :—

Locality.	No. of Samples.	Locality.	No. of Samples.
Nova Scotia—		Brought forward.....	78
Halifax.....	11	Ontario—	
Dartmouth.....	4	Carleton Place.....	4
	15	Arnprior.....	4
New Brunswick—		Ottawa.....	13
St. Andrews.....	2		21
St. Stephens.....	2	Ottawa.....	5
Sussex.....	2	Peterboro'..	6
Moncton.....	6	Toronto..	12
	12	Port Hope.....	3
Quebec			26
St. Joseph.....	2	London ..	9
Quebec.....	10	Sarnia.....	6
Three Rivers.....	6	Goderich.....	3
Montreal ..	6	Mitchell ..	3
	24		21
Montreal.....	9	Manitoba—	
Montreal W.	6	Winnipeg.....	11
Granby.....	7	Deloraine.....	2
St. Hyacinthe.....	5	Boissevain..	2
	27	Brandon.....	3
Carried forward.....	78		18
		British Columbia—	
		Vancouver.....	18
		Total.....	182

The names of the parties from whom these samples were obtained, together with other particulars, are given in the tabulated statement appended to this report. In this the analytical results are also detailed, not only of the samples submitted to the district analysts, but of the duplicates supplied to the Department as well. Opposite the description of each sample will be found two lines of figures, the upper one being as re-

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ported by the district analyst, and in the lower one are given the results obtained in this laboratory. Classifying the whole number of samples collected according to the remarks by the analysts, the following statement is obtained :—

Provinces.	Genuine.	Doubtful, from differences in Analysis.	Partly Cream.	Under average in non-fatty solids.	Under average in Cream.	Under average in total solids.	Skimmed.	Partly skimmed.	Watered.	Total.
Nova Scotia.	10	1	...	2	...	1	...	...	1	15
New Brunswick.. . . .	8	...	3	1	...	1	...	...	...	12
Quebec.....	29	...	4	7	1	5	1	3	1	51
Ontario.....	34	5	5	1	16	6	...	1	...	68
Manitoba.....	10	1	3	1	2	1	...	...	...	18
British Columbia.. . . .	11	1	...	..	..	6	...	...	...	18
	102	8	14	12	19	20	1	4	2	182

In order to make a comparison of these figures with those of former years, it is necessary to deduct the samples which have been made doubtful by analytical differences from the total number collected, and also to add to the genuine samples those which have been characterized as ‘partly cream,’ because the latter were in former years generally described as genuine. After doing this the classification stands as follows :—

Provinces.	Genuine.	Uncertain	Adulterated.	Total.
Nova Scotia.....	16	3	1	14
New Brunswick.	10	2	0	12
Quebec.....	33	13	5	51
Ontario.	39	23	1	63
Manitoba.....	13	4	0	17
British Columbia.....	11	6	0	17
	116	51	7	174

Compared with the figures of former bulletins the following percent- ages result :—

	Genuine.	Uncertain.	Adulterated.
	p. c.	p. c.	p. c.
1895.....	70·8	22·3	6·9
1897.....	65·0	24·0	11·0
1898.....	73·0	23·0	4·0
1901.....	66·7	29·3	4·0

From this comparison it would appear that, while the percentage of undoubtedly adulterated samples has remained stationary, a decided increase in the number of those which have been regarded as uncertain is apparent. As a consequence it becomes necessary to ascertain the character of these uncertain samples, including those which show

analytical differences or have been said to be ‘partly cream.’ Having regard to the cause of uncertainty these samples may be recapitulated as follows :—

	Number of Samples.
1. Differences in analysis.....	8
2. Admixture of cream.....	14
3. Deficiency in solids not fat.....	12
4. Deficiency in butter fat.....	19
5. Deficiency in total solids.....	20
Total.....	73

In those samples which are classed under 1. it has been found that the results reported by the district analyst differ very materially from those obtained in analysing the duplicates in this laboratory. According to section 9 of the Adulteration Act, the food inspector on collecting a sample is bound to divide it into three parts, one for the vendor, one for the Department and one for the district analyst. If, in making this division, he is not very careful to agitate the sample thoroughly, then differences are sure to arise in the analysis of the duplicates. Such want of care in mixing the samples is probably the cause of the differences. Indeed in the case of sample No. 20081 (Nova Scotia) the difference there shown has been traced to negligence of this sort on the part of the officer who collected the sample. Of course this does not exclude the possibility of error on the part of the analyst who may not thoroughly mix his duplicate before taking out the portion for analysis. Samples exhibiting differences in the analysis such as to materially affect the analyst’s judgment regarding its genuineness may be recognized by the word ‘doubtful’ in the column containing the analysts’ remarks.

A second cause of uncertainty is the presence of an abnormally high percentage of butter-fat. When this exceeds six per cent., especially if the other solids are abnormally low, there is good reason for believing that cream has been added by the vendor. This may be done for the purpose of supplying the inspector with an extra good sample, so good, in fact as to disqualify the article from ranking as ‘milk.’ The percentage of butter-fat in such cases frequently runs up to 7 or 8 per cent. and fully justifies the analyst in using the remark ‘partly cream’ and in withholding the opinion that the samples in question are of ‘genuine’ milk. The number of these sold is on the increase, and appears to be a proof that some milk dealers are anxious, in an irregular way, to improve the quality of their milk supply. It cannot, however, be said that samples 20936, 20937 and 20939 were sold to the public as milk, because they were obtained by the food inspector from parties who were delivering milk to one of our city dairy companies.

Respecting the delivery it is necessary to state that some milk dealers are in the habit of carrying in their waggons’ in separate vessels, milks of different qualities, and it is suspected that this is for the purpose of supplying particular customers with milk of superior quality as regards butter-fat. The following samples were taken from three different cans in the same waggon which were said to contain only milk :—

No. of Sample.	Per cent. Butter-fat.	Per cent. Nonfatty solids.	Per cent. Total solids.
20584	3·25	8·73	11·98
20585	3·24	8·61	11·85
20586	8·36	8·61	16·97

It will be observed that the driver of this milk waggon had abundant opportunity, by judiciously mixing the contents of these cans, to vary the quality of the milk according to the more or less exacting demands of his customers. In the present collection instances of a similar nature may be studied by referring to samples 21060, 21061, 21068, 21069, 21075, 21076, 20930 and 20933.

The third cause of uncertainty as stated above lies in the deficiency of non-fatty solids while at the same time the percentage of butterfat is normal or even somewhat above the average of 3·75 per cent. Distinct instances of this sort are those numbered

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21048, 21084 (Prov. Quebec). As I have said in a former report, 'it is difficult to, account for 'the composition of this class of samples unless on the theory that they 'are the product of watering rich milk.' Greater precision than is at present practised would seem to be necessary in the use of the opinion 'under average in non-fatty solids' and I would suggest that it be applied only in cases where the solids not fat, are under 8.25 per cent. the butter-fat exceeds 3.75 and the total solids are not under 12 per cent.

The uncertain samples classed under 4, as being deficient in butter-fat, are usually indicated by the expression "under average in cream." It, of course, implies a suspicion of a slight amount of skimming, and is used ordinarily when the fat ranges between 3 and 3.5 per cent, and the non-fatty solids are normal. The latter will rarely be under 8.5 per cent, nor the total solids lower than 12 per cent. When the solids not fat amount to 8.5 or over, and the butter fat sinks lower than 3 per cent, it has been customary to report the sample as "partly skimmed," the uncertainty disappearing. When the percentage of butter fat sinks under 2 per cent the sample is usually regarded as "skimmed." Of this character there is one sample in the present collection.

Under 5 there have been distinguished another series of uncertain samples on account of their deficiency in total solids. This deficiency carries the percentage of the latter always below 12, with a corresponding reduction of the non-fatty solids. The use of the expression "under average in total solids" always indicates a suspicion of watering, and when in such cases the non-fatty solids sink under 8 per cent and the butter-fat below 3.75 per cent it is not unreasonable to use the term watered. There is one instance of this nature in the present collection.

The foregoing information regarding such 'doubtful' and uncertain samples was given in Bulletin No. 43 but I have thought it necessary to take this opportunity of enlarging upon the meaning of the expressions used, in order if possible to obtain greater precision in their use hereafter. Unless the district analysts are careful in using them, and unless uniformity prevails as regards the sense in which they are used, the worth of any comparison made between the collections of different years becomes invalidated and it becomes difficult to say whether any advance is being made in the suppression of milk adulteration. Of course, the district analysts, being independent officials, are not bound to follow such suggestions as the foregoing. It is their duty to exercise their own judgment, especially since no standard as regards the composition of milk, has yet been established in Canada, nor any 'limits of variability' fixed by Order in Council, as is possible under section 19 of the Adulteration Act.

It is necessary to state that in making this collection, bichromate of potash was used as a preservative in the proportion of very nearly 0.1 gramme to 100 ccm of milk, and in reporting the results the analysts were desired to make corrections accordingly. This salt was found to answer the purpose very well, especially in the case of the samples from Vancouver, B.C. By an inadvertence these were forwarded by freight and the transmission to Ottawa occupied 30 days. Nevertheless the samples were found to be in good condition for analysis, and it was easily possible to redistribute through the sample any separation of cream which had taken place.

I have to recommend the publication of this report.

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

2-3 EDWARD VII., A. 1903

RESULTS of the Examination of 182 Samples of Milk.

Date of Collection	Number of Sample.	Name and Address of Vendor.	Sp. gr. at 15 C.	ANALYSIS.			Total Solids.	Remarks by Analysts.
				Butter Fat.	Non-fatty Solids.	Water.		
				p. c.	p. c.	p. c.	p. c.	
1901.		<i>Halifax, N.S.</i>						
Oct. 15..	20070	H. Burgess, Brunswick St.....	1·0322 1·0322	3·53 3·40	8·71 8·23	87·76 88·37	12·24 11·63	Genuine.
" 15..	20071	Mrs. Merrigan, Upper Water St.	1·0337 1·0342	4·31 4·17	9·44 8·99	86·25 86·84	13·75 13·16	"
" 15..	20072	Miss Hills, Lockman St.....	1·0326 1·0332	3·48 3·24	8·72 8·28	87·80 88·48	12·20 11·52	"
" 15..	20073	H. D. Grant.....	1·0329 1·0332	3·83 3·59	8·80 8·48	87·37 87·93	12·63 12·07	"
" 16..	20074	Scotia Pure Milk Co.....	1·0306 1·0302	4·08 3·88	8·26 7·93	87·66 88·19	12·34 11·81	Below average in solids; not fat.
" 16..	20075	" "	1·0317 1·0322	4·69 4·54	8·85 8·55	86·46 86·91	13·54 13·09	Genuine.
" 16..	20076	" "	1·0308 1·0307	4·30 4·02	8·43 7·98	87·27 88·00	12·73 12·00	"
" 16..	20077	" " (Pasteurized)	1·0317 1·0317	4·23 3·95	8·55 8·32	87·22 87·73	12·78 12·27	"
" 16..	20078	Mrs. O'Brien, North St.....	1·0317 1·0317	4·34 4·16	8·64 8·11	87·02 87·73	12·98 12·27	"
" 16..	20079	D. A. MacDonald, Agricola St....	1·0294 1·0302	4·19 4·26	8·37 7·71	87·44 88·03	12·56 11·97	Below average in solids; not fat.
" 16..	20080	Mrs. Carroll, Grafton St..... <i>Dartmouth, N.S.</i>	1·0270 1·0272	2·76 2·79	7·26 6·73	89·98 90·48	10·02 9·52	Watered; adulterated.
" 17..	20081	R. Laidlaw.....	1·0326 1·0282	2·94 6·26	8·69 7·93	88·37 85·81	11·63 14·19	Doubtful, sample not properly mixed before dividing.

RESULTS of the Examination of 182 Samples of Milk—Continued.

Date of Collection	Number of Sample.	Name and Address of Vendor.	Sp. gr. at 15 C.	ANALYSIS.			Total Solids.	Remarks by Analysts.
				Butter Fat.	Non-fatty Solids.	Water.		
				p. c.	p. c.	p. c.	p. c.	
1901.		<i>St. Joseph, P.Q.</i>						
Sept. 11.	21039	Hubert Samson.	1.0348 1.0347	1.67 1.49	8.32 8.21	90.91 90.30	9.99 9.70	Skimmed and therefore adulterated.
" 11.	21040	Jean Vezina.	1.0333 1.0327	3.23 2.74	8.20 8.11	88.57 88.85	11.43 11.15	Under-average in butter fat and other solids
" 11.	21041	Madame Guay	1.0328 1.0306	3.96 3.70	8.32 8.15	87.72 88.15	12.28 11.85	Genuine.
" 11.	21042	F. N. Dumont	1.0333 1.034	3.21 3.10	8.78 8.59	88.01 88.31	11.99 11.69	Under average in butter fat; doubtful.
" 11.	21043	Joseph Pouliot, Masson St.	1.0323 1.034	4.60 4.36	8.51 8.37	86.89 87.27	13.11 12.73	Genuine.
" 11.	21044	John Drundon, Hedley Lodge.	1.0323 1.0317	4.03 3.81	8.50 8.36	87.47 87.80	12.53 12.20	"
" 11.	21045	Theo. Trudel.	1.0328 1.0317	4.18 3.89	8.52 8.45	87.30 87.66	12.70 12.34	"
" 11.	21046	B. Guerin	1.0323 1.0317	4.19 4.86	9.55 8.39	86.26 86.75	13.74 13.25	"
" 11.	21047	Mathias Langlois, Delard St.	1.0317 1.0306	4.27 4.31	8.52 8.48	87.21 87.21	12.79 12.79	"
" 11.	21048	Ernest Langlois, 59 St. Luke St.	1.0302 1.0301	4.54 4.33	8.06 7.81	87.40 87.86	12.60 12.14	Under average in solids; not fat.
11.	21049	Josh. Paradis, 8 Kironack St.	1.0323 1.0317	4.71 4.47	8.60 8.38	86.69 87.15	13.31 12.85	Genuine.
11.	21050	Ocative Dupuis, 317 St. Oliver St.	1.0302	5.00	8.27	86.73	13.27	"

<i>Three Rivers, P.Q.</i>											
"	17..	21051	W. Pratte.....	1.0314 1.0335	3.64 3.39	8.77 8.65	87.59 87.96	12.41 12.01	"		
"	17..	21052	E. Leblanc.....	1.0314 1.0335	3.84 3.51	8.93 8.89	87.23 87.60	12.77 12.40	"		
"	17..	21053	A. Beaudry.....	1.0329 1.0333	3.85 3.52	8.69 8.53	87.46 87.95	12.51 12.05	"		
"	17..	21054	P. Gouin.....	1.0336 1.0333	3.14 2.92	8.53 8.39	88.33 88.69	11.67 11.31	Under average in butter at.		
"	17..	21055	Theo. Beaudry..	1.0333 1.0335	1.18 3.92	8.83 8.65	86.99 87.43	13.01 12.57	Genuine		
"	17..	21056	Thos. Fortin..	1.0324 1.0325	4.17 3.92	8.52 8.36	87.31 87.72	12.69 12.28	"		
<i>Montreal.</i>											
Oct.	20..	21057	J. L. Tremblay, Blue Bonnets.....	1.0309 1.0296	6.01 5.79	8.46 8.25	85.53 85.96	11.47 11.04	Partly cream.		
"	20..	21058	E. Noelle, 1511 St. Hubert.....	1.0325 1.0322	4.32 4.11	8.78 8.61	86.99 87.28	13.10 12.72	Genuine.		
"	20..	21059	Archie Drummond, Petite Côte.....	1.0335 1.0322	2.87 2.76	8.63 8.32	88.50 88.92	11.50 11.08	Too low in butter fat; partly skimmed; adulterated		
"	20..	21060	A. B. Bishop, St. Laurent.....	1.0303 1.0291	5.64 5.56	8.39 7.90	86.06 86.54	13.94 13.46	Partly cream.		
"	20..	21061	"	1.0308 1.0306	4.74 4.54	8.37 8.20	86.89 87.26	13.11 12.74	Genuine		
"	20..	21062	W. A. Cornell, Point Aux Trembles.....	1.0309 1.0311	3.02 2.84	8.00 7.89	88.98 89.27	11.02 10.73	Low in butter fat and other solids; probably watered.		

The first line in each of the foregoing samples shows the results reported by Dr. M. Fiset, Official Analyst, Quebec.
The second line shows the analysis by Miss M. Tyrrell, Inland Revenue Laboratory, Ottawa.

RESULTS of Examination of 182 Samples of Milk *Continued.*

Date of Collection	Number of Sample.	Name and Address of Vendor.	Sp. gr. at 15° C.	ANALYSIS			Total Solids.	Remarks by Analysts.
				Butter Fat.	Non-fatty Solids.	Water.		
				p. c.	p. c.	p. c.	p. c.	
1901.		<i>Montreal.</i>						
Oct. 5..	21066	J. Brenner, Côte St. Laurent.....	1·032 1·0323	3·79 3·54	8·35 8·34	87·86 88·12	12·14 11·88	Under average in non-fatty solids.
" 5..	21067	" "	1·031 1·0318	4·87 3·92	8·01 8·48	87·12 87·60	12·88 12·40	" "
" 5..	21068	U. Beauchamp, 450 Letourneau	1·0292 1·0298	4·44 4·20	7·89 8·08	87·67 87·72	12·33 12·28	" "
" 5..	21069	" "	1·0274 1·028	6·97 6·90	7·83 7·47	85·20 85·63	14·80 14·37	Partly cream.
" 5..	21070	Thos. Hale, Sault au Recollet.....	1·0332 1·0335	3·88 3·92	8·77 8·52	87·35 87·56	12·65 12·44	Unadulterated.
" 5..	21071	A. D. Howat, 255 Hibernia.....	1·0337 1·034	4·16 4·22	9·03 8·65	86·81 87·13	13·19 12·87	"
" 5..	21072	" "	1·0352 1·035	3·80 3·77	9·30 9·02	86·90 87·21	13·10 12·79	"
" 5..	21073	Wm. Reinhold, 990 Sanguinet.....	1·0343 1·034	2·70 2·69	8·68 8·56	88·62 88·75	11·38 11·25	Adulterated, partly skimmed.
" 5..	21074	" "	1·0345 1·035	2·63 2·67	8·79 8·65	88·58 88·68	11·42 11·32	" "
Oct. 11..	21075	A. E. Ashton	1·0264 1·0266	8·76 7·87	7·50 7·94	83·74 84·19	16·26 15·81	Partly cream.
" 11..	21076	"	1·032 1·0317	3·78 3·59	7·98 8·31	88·24 88·10	11·76 11·90	Under average in total solids and solids not fat.
" 11..	21077	"	1·0294 1·0296	3·27 2·98	7·16 7·52	89·57 89·50	10·43 10·50	Adulterated, watered.

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"	11..	21078	T. Arrowsmith	1·0326 1·0327	3·95 3·75	8·24 8·66	87·81 87·59	12·19 12·41	Under average in non-fatty solids.
"	11..	21079	"	1·033 1·0337	3·98 3·69	8·44 8·88	87·58 87·43	12·42 12·57	Unadulterated.
"	11..	21080	"	1·0325 1·0327	4·14 3·65	8·41 8·57	87·45 87·78	12·55 12·22	"
"	11..	21081	W. E. Bowker..... <i>Montreal, West.</i>	1·0316 1·0312	4·69 4·44	8·29 8·62	87·02 86·94	12·98 13·06	"
"	16..	21082	Park Bros.....	1·0324 1·0322	3·68 3·42	8·31 8·27	88·01 88·31	11·99 11·69	Under average in total solids.
"	16..	21083	"	1·0324 1·0322	3·53 3·24	8·40 8·35	88·07 88·41	11·93 11·59	Unadulterated.
"	16..	21084	Clement Petigean.....	1·031 1·0327	3·96 3·69	8·19 8·11	87·85 88·20	12·15 11·80	Under average in solids not fat.
"	16..	21085	"	1·0306 1·0312	4·80 4·51	8·22 8·12	86·98 87·37	13·02 12·63	"
"	16..	21086	H. Candlist	1·0327 1·0322	4·26 3·96	8·70 8·47	87·04 87·57	12·96 12·43	Unadulterated.
"	16..	21087	"	1·0334 1·0332	4·00 3·67	8·74 8·68	87·26 87·65	12·74 12·35	"
"	17..	21088	L. Marchesault..... <i>St. Hyacinthe, P.Q.</i>	1·0328 1·0322	4·05 3·70	8·35 8·44	87·60 87·86	12·40 12·14	"
"	17	21089	E. Clapin	1·0328 1·0332	3·64 3·38	8·59 8·42	87·77 88·20	12·23 11·80	"
"	17..	21090	"	1·032 1·0322	4·67 4·34	8·34 8·32	86·99 87·34	13·01 12·66	"
"	17..	21091	Louis Carrier.....	1·0321 1·0322	4·41 4·17	8·47 8·38	87·12 87·45	12·88 12·55	"
"	17..	21092	Josh. Laberge	1·0328 1·0322	4·68 4·18	8·53 8·46	86·79 87·06	13·21 12·94	"

The first line in each of the foregoing samples shows the results reported by A. L. Touchot, official analyst, St. Hyacinthe.
The second line shows the analysis by Miss M. Tyrrell, Inland Revenue Laboratory, Ottawa.

RESULTS of the Examination of 182 Samples of Milk *Continued.*

Date of Collection	Number of Sample.	Name and Address of Vendor.	Sp. gr. at 15 C.	ANALYSIS.				Total Solids.	Remarks by Analyst.
				Butter Fat.	Non-fatty Solids.	Water.			
1901.		<i>Charleton Place, Ont.</i>		p. c.	p. c.	p. c.	p. c.		
Sept. 5.	20922	Jas. Hendry	1.0344	3.60 6.13	9.75 8.52	86.65 85.35	13.35 14.65	Genuine.	
"	20923	"	1.0354	3.18 2.69	8.42 8.67	88.40 88.64	11.60 11.36	Below average in fat and total solids.	
"	20924	Wm. Bennett	1.0307	2.83 3.16	7.73 8.71	89.44 88.13	10.56 11.87	Doubtful.	
"	20925	"	1.0314	2.68 6.16	7.60 8.37	89.72 85.47	10.28 14.53	"	
"	20926	P. P. Farmer (from pint bottle)	1.0393	2.96 6.25	8.24 8.53	88.80 85.22	11.20 14.78	"	
"	20927	" (from quart bottle)	1.0350	1.33 12.30	8.92 7.67	86.75 80.03	13.25 19.97	Genuine.	
"	20928	Thos. Havey	1.0318	3.14 3.81	9.88 8.74	86.98 87.45	13.02 12.55	Doubtful.	
"	20929	"	1.0362	3.58 3.70	9.19 8.80	87.23 87.50	12.77 12.50	Genuine.	
"	20930	W. Graham, a sample from each can in wagon.	1.0368 1.0304	7.29 7.21	9.37 8.27	83.34 84.52	16.66 15.48	Partly cream.	
"	20931	"	1.0357 1.0309	5.57 5.00	8.59 8.14	85.84 86.86	14.16 13.14	Genuine.	
"	20932	"	1.0377 1.0314	5.61 4.78	8.61 8.18	85.75 87.01	14.25 12.96	"	

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"	9...	20933	"	"	1.0380 1.0334	4.78 4.23	9.19 8.59	86.03 87.18	13.97 12.82	
"	9...	20934	"	"	1.0350 1.0329	5.28 4.33	8.82 8.75	85.90 86.92	14.10 13.08	"
"	9...	20935	"	"	1.0369 1.0324	5.31 4.70	8.90 8.63	85.79 86.67	14.21 13.33	
Sept.	9...	20936	Taken from wagons at Dairy Company's Offices, Ottawa, before delivery.			20.72 19.55	7.40 6.54	71.88 73.91	28.12 26.09	Partly cream.
"	9...	20937	"	"	1.0230 1.0146	20.86 17.14	4.91 6.81	74.23 76.02	25.77 23.98	"
"	9	20938	"	"	1.0380 1.0299	3.25 5.61	11.11 8.15	85.64 86.24	14.36 13.76	Genuine.
"	9.	20939	"	"	1.0292 1.0177	12.27 12.93	9.67 7.41	78.06 79.66	21.94 20.34	Partly cream.
"	9...	20940	"	"	1.0286 1.0258	8.12 8.85	9.68 8.04	82.20 83.11	17.80 16.89	"
"	9	20941	Taken from Dairy Company's wagons on street as being supplied to customers.			3.96 3.59	9.64 8.38	86.40 88.03	13.60 11.97	Genuine.
"	9.	20942	"	"	1.0378 1.0325	3.39 3.22	8.71 8.58	87.90 88.20	12.10 11.80	"
The first line in each of the foregoing samples shows the results reported by Dr. F. N. Valade, Official Analyst, Ottawa. The second line shows the analysis by Miss M. Tyrrell, Inland Revenue Laboratory, Ottawa.										
Oct.	9...	22501	J. H. Bell	Peterborough, Ont.	1.0308 1.033	3.12 3.45	9.05 8.44	87.83 88.11	11.17 11.89	Under average in cream.
"	9...	22502	"	"	1.0286 1.0319	3.26 3.27	8.89 8.15	87.85 88.58	12.15 11.42	"
"	9...	22503	"	"	1.047 1.0336	3.66 3.84	9.65 8.94	86.69 87.22	13.31 12.78	Genuine.
"	9	22504	T. Lillie	"	1.0312 1.0314	3.94 3.99	9.22 8.44	86.84 87.59	13.16 12.41	"
"	9...	22505	"	"	1.0315 1.0320	3.79 3.76	9.27 8.50	86.91 87.74	13.06 12.26	"
9	9	22506	"	"	1.0334 1.0314	4.01 3.97	9.11 8.44	86.85 87.59	13.15 12.41	"

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"	11..	22519	G. R. Race	Port Hope.	1.0308 1.0312	3.34 3.35	9.11 8.22	87.55 88.43	12.45 11.57	"
"	11..	22520	Geo. Bennett		1.0334 1.0337	2.46 2.60	9.23 8.41	88.31 88.99	11.69 11.01	Partly skimmed and therefore adulterated.
"	11..	22521	"	Ottawa.	1.0318 1.0327	3.00 3.17	11.00 8.32	86.00 88.51	14.00 11.49	Under average in cream.
Oct.	21..	22571	Ottawa Dairy Company, from cans, as being delivered on company's premises.		1.0312 1.030	5.71 6.21	9.36 8.10	84.93 85.69	15.07 14.31	Genuine.
"	21..	22572	"		1.0302 1.030	5.46 5.35	8.89 7.88	85.65 86.77	14.35 13.23	"
"	21..	22573	"		1.0315 1.032	4.91 4.60	9.23 8.27	85.86 87.13	14.14 12.87	"
"	21..	22574	Ottawa Dairy Company, from milk wagons on street as being delivered to customers.		1.0312 1.0315	3.86 3.87	9.00 8.31	87.14 87.82	12.86 12.18	"
"	21..	22575	"		1.0308 1.032	5.82 3.82	7.38 8.55	86.80 87.63	13.20 12.37	Under average in solids, not fat.

The first line in each of the foregoing samples shows the results reported by Dr. W. H. Ellis, Official Analyst, Toronto.
The second line shows the analysis by Miss M. Tyrrell, Inland Revenue Laboratory.

Sept.	11..	21954	Sanitary Dairy Co.: From wagon on street.	London, Ont.	1.0328 1.0260	2.57 7.67	8.60 7.47	88.83 84.86	11.17 15.14	Doubtful.
"	11..	21955	John Rodgers		1.0326 1.0323	3.22 3.23	8.61 8.01	88.17 88.76	11.83 11.24	Below average in cream.
"	11..	21956	Chas. O'Brien		1.0316 1.0312	3.49 3.32	8.29 7.77	88.22 88.91	11.78 11.09	Under average in total solids.
"	11..	21957	Frank Fortner, 406 Colbourne St.		1.0333 1.0333	3.10 2.66	8.71 8.28	88.19 89.06	11.81 10.94	Under average in cream.
"	11..	21958	Sanitary Dairy, company's factory.		1.0325 1.0323	3.71 3.43	8.61 8.08	87.68 88.49	12.32 11.51	Genuine.
"	11..	21959	John Hill, Forest City Dairy		1.0312 1.0312	3.17 2.55	8.21 7.80	88.62 89.65	11.38 10.55	Under average in cream and in solids not fat. Probably adulterated.

Results of the Examination of 182 Samples of Milk *Continued.*

Date of Collection.	Number of Sample.	Name and Address of Vendor.	Sp. gr. at 15°C.	ANALYSIS.			Total Solids.	Remarks by Analysts.
				Butter Fat.	Non Fatty Solids.	Water.		
1901.		<i>London, Ont., Concluded.</i>						
Sept. 11.	21960	Sanitary Dairy Co.: From factory...	1.0321 1.0318	3.82 3.22	8.54 8.32	87.64 88.46	12.36 11.54	Genuine.
" 11.	21961	" " " " " " " " " " " "	1.0314 1.0312	3.05 2.72	8.18 7.83	88.77 89.45	11.23 10.55	Below average in cream and in solids not fat. Probably adulterated by addition of water.
" 11.	21962	" " " " " " " " " " " "	1.0320 1.0308	3.95 3.65	8.38 8.17	87.67 88.18	12.33 11.82	Genuine.
" 13.	21963	J. Smith... <i>Sarnia, Ont.</i> " " " " " " " " " " " "	1.0310 1.0318	3.69 3.55	8.23 8.06	88.08 88.39	11.92 11.61	Under average in total solids.
" 13.	21964	Wm. Battle.... " " " " " " " " " " " "	1.0272 1.0265	5.80 5.67	7.83 7.62	86.37 86.71	13.63 13.29	Partly cream.
" 13.	21965	Chas. Carr... " " " " " " " " " " " "	1.0320 1.0323	3.29 3.16	8.43 8.32	88.28 88.52	11.72 11.48	Below average in cream.
" 13.	21966	N. L. Hiller.... " " " " " " " " " " " "	1.0307 1.0302	4.49 4.37	8.46 8.21	87.05 87.42	12.95 12.58	Genuine.
" 13.	21967	John McWhorter. " " " " " " " " " " " "	1.0316 1.0328	3.88 3.71	8.72 8.46	87.40 87.83	12.60 12.17	"
" 13.	21968	Andrew McRitchie..... <i>Goderich, Ont.</i> " " " " " " " " " " " "	1.0328	5.36 4.83	9.24 8.59	85.40 86.58	14.60 13.42	" very rich milk.
" 17.	21969	Gordon Bessett..... " " " " " " " " " " " "	1.0319 1.031	3.40 3.32	8.56 7.92	88.04 88.76	11.96 11.24	Under average in cream.
" 17.	21970	John Porter, jr..... " " " " " " " " " " " "	1.0312 1.0315	4.11 3.92	8.42 8.13	88.17 87.95	12.83 12.05	Genuine.
" 17	21971	Gordon Imrie..... " " " " " " " " " " " "	1.0329 1.033	3.60 3.08	8.41 8.23	87.96 88.69	12.04 11.31	"

		<i>Mitchell, Ont.</i>							
"	18..	21972	Westie Parrish..	1.0306	4.06	8.40	87.54	12.46	"
				1.0312	4.04	8.08	87.88	12.12	
"	18..	21973	Geo. Milligan	1.0308	4.23	8.47	87.30	12.70	"
				1.0322	3.89	8.20	87.91	12.09	
"	18..	21974	Allen Casey.....	1.0323	4.25	8.43	87.32	12.68	"
				1.0321	3.77	8.23	88.00	12.00	

The first line in each of the foregoing samples shows the results reported by Mr. E. T. Harrison, Official Analyst, London, Ont.
The second line shows the analysis by Miss M. Tyrrell, Inland Revenue Laboratory, Ottawa.

		<i>Winnipeg, Man.</i>							
Oct.	2..	17362	C. Johnson.	1.0316	4.27	8.72	87.01	12.99	Genuine
				1.0317	4.28	8.61	87.11	12.89	
"	2..	17363	Hy. Corbell..	1.0313	4.22	8.76	87.02	12.98	"
				1.0323	3.92	8.58	87.50	12.50	
"	2..	17364	Aberdeen Ave. Dairy.	1.0253	4.44	7.16	88.40	11.60	Non fatty solids below average.
				1.0276	4.14	7.11	88.75	11.25	
"	2..	17365	J. W. Ferguson	1.0283	3.71	7.80	88.49	11.51	Below average.
				1.0317	3.40	7.80	88.80	11.20	
"	2..	17366	W. S. Craig	1.0313	5.59	8.89	85.52	14.48	Genuine.
				1.0327	5.17	8.55	86.28	13.72	
"	2..	17367	Wm. Craig.....	1.0288	7.29	8.74	88.97	16.03	Partly cream.
				1.0296	6.99	8.16	84.85	15.15	
"	2..	17368	J. G. Dolman..	1.0311	5.02	8.84	86.14	13.86	Genuine.
				1.0333	4.51	8.70	86.76	13.24	
"	2..	17369	E. Taylor, Dorset Dairy	1.0288	7.83	8.65	83.52	16.48	Partly cream.
				1.0296	7.23	8.33	84.11	15.56	
"	2..	17370	E. W. Edwards, Toronto Dairy	1.0308	5.55	8.92	85.53	14.47	Genuine.
				1.0313	4.98	8.57	86.45	13.55	
"	2..	17371	Stone Stoneson.....	1.0316	5.31	8.91	85.78	14.22	"
				1.0327	4.76	8.58	86.66	13.34	
"	2..	17372	S. Bibeau, St. Boniface Dairy.	1.0307	6.60	8.90	84.50	15.50	Partly cream.
				1.0291	6.13	8.62	85.25	14.75	

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"	11..	21614	J. G. Kirkwood	1·030	3·32 3·31	8·08 8·55	88·60 88·14	11·40 11·86	Under average in total solids.
"	11..	21615	W. Clarke.....	1·032	4·83 4·80	8·31 8·71	86·86 86·49	13·14 13·51	Genuine.
"	11..	21616	Valley Dairy Co.	1·031	3·22 3·15	8·05 8·43	88·73 88·42	11·27 11·58	Under average in total solids.
"	11..	21617	J. N. Bond.....	1·030	2·99 2·91	8·01 8·42	89·00 88·67	11·00 11·33	Under average in fat and total solids; a poor milk.
"	12..	21618	Eligh & Metcalfe..	1·031	3·75 3·61	8·21 8·48	88·04 87·91	11·96 12·09	Genuine.
"	12..	21619	J. W. McLeod	1·032	3·78 3·93	8·68 8·92	87·54 87·15	12·46 12·85	"
"	12..	21620	T. F. Newington.....	1·031	4·03 3·82	8·00 8·46	87·97 87·72	12·03 12·28	"
"	12..	21621	J. Wolfor ..	1·030	4·87 3·54	7·80 8·35	87·32 88·11	12·68 11·89	"
"	12..	21622	D. McDougall.....	1·031	3·95 3·87	8·28 8·80	87·77 87·33	12·23 12·67	"
"	12..	21623	T. Moserop.....	1·032	4·15 4·13	8·54 8·87	87·31 87·00	12·69 13·00	"
"	14..	21624	D. McDougall.....	1·030	3·99 3·92	8·08 8·56	87·93 87·52	12·07 12·48	"
"	14..	21625	J. McGee.....	1·030	3·65 3·56	8·00 8·16	88·35 88·28	11·65 11·72	Below average in total solids.
"	14..	21626	Jas. Armstrong.....	1·031	3·98 3·91	8·06 8·13	87·96 87·66	12·04 12·34	Genuine.
"	14..	21627	N. Newman ..	1·029	2·80 3·63	7·68 8·56	89·52 87·81	10·48 12·19	Doubtful.
"	11..	21628	S. Grass.....	1·031	3·66 3·01	8·22 7·92	88·12 89·07	11·88 10·93	Below average in total solids.
"	14..	21629	Valley Dairy ..	1·030	4·26 4·17	7·85 8·59	87·89 87·24	12·11 12·76	Genuine.

The first line in each of the foregoing samples shows the results reported by Dr. C. J. Fagan, Official Analyst, British Columbia.
The second line shows the analysis by T. Macfarlane, Chief Analyst, Inland Revenue Laboratory, Ottawa.

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APPENDIX I.

BULLETIN No. 81.—FERTILIZERS.

OTTAWA, June 26, 1902.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—In accordance with the provisions of the Fertilizers Act, 1890, which requires manufacturers or importers to transmit standard samples to the Department of the goods they propose to sell in Canada, 106 such samples were received for the present year and have been analysed in this laboratory. Table I., accompanying this report, gives the results of examining these standard samples, together with the names of their manufacturers or importers. The commercial names of the various brands, statements as regards the materials from which they were produced, and the guaranteed analyses of the manufacturers will also be found recorded in Table I. It will be observed that the upper line opposite each brand gives the percentages of fertilizing constituents guaranteed by the manufacturers, and the lower line the results of the analyses carried out in this laboratory. As required by the Act the table also contains a column in which 'the relative value of each fertilizer calculated from its contents in fertilizing ingredients is given,' the prices of these ingredients being as follows:—

	Cents per pound.
Nitrogen in salts of ammonia or nitrates.....	13
Organic nitrogen in ground bone, fish, blood or tankage...	12
Phosphoric acid, soluble in water.....	6
" soluble in a 1 p.c. solution of citric acid.....	5½
" insoluble, in Thomas' Phosphate Powder.....	3½
" insoluble, in ground rock phosphate or in com- pound fertilizers.....	1½
Potash, contained in wood ashes.....	6
" from high grade potash salts.....	5¼

Besides Table I. there is also attached to this report a tabulated statement giving the results of obtaining samples of fertilizers in the open market. The collection was made, in accordance with your instructions, in the months of March and April last, and all the information obtained, as well as the results of submitting them to the district analysts for examination, are given in Table II. It will be observed with regard to each of these 'fertilizers as sold' that, in most cases, there are three lines of figures opposite the description of each sample. The uppermost of these shows the contents guaranteed by the manufacturer; the next lower line gives the percentage of fertilizing constituents found in the standard sample, and the lowest line gives the same percentages as found by the district analysts in the sample collected. In cases where no standard samples have been submitted to the department, and, nevertheless, in contravention of the Fertilizers Act, the brands in question have been offered for sale, the two upper lines will, of course, show no figures. The number of such samples of fertilizers, not registered and therefore illegally sold, and to which I called your attention in a report dated April 28, 1902, amounts to ten, which, compared with the number of similar samples in 1901 (eleven), does not show much improvement. In such cases it has been customary heretofore to warn offending parties, but this does not seem to have

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the effect of preventing these contraventions of the Fertilizers Act, and I have to submit for your consideration the question as to whether some more severe method of dealing with such infractions should not be resorted to.

According to the opinions expressed by the district analysts, five out of the 85 samples collected have been found to be adulterated, being deficient in available phosphoric acid or other fertilizing constituents, while eight others have been characterized as being 'below guarantee.' This is not quite such a favourable showing as that of last year.

I beg to recommend the publication of this report, with the tables attached to it, as well as the 'Memoranda on Manures' which it is customary to print at the same time.

I have the honour to be, Sir
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

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TABLE I.—Statement of the Results of Examining 106 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name or Brand of Fertilizer.
1250	The American Agricultural Chemical Co., Boston, Mass.	Manufacturers		'Bradley's B. D. Sea Fowl Guano'— Guaranteed Found
1251	" "	"		'Bradley's Complete Manure for Potatoes and Vegetables'— Guaranteed Found
1252	Canadian Pacific Fish Oil and Guano Co., Ladner, B.C..	"		'Guano or Fish Fertilizer'— Guaranteed Found
1253	The William Davies Co., Ltd., Toronto.	"	Dried blood, bones and tankage.	Fertilizer 'Exhibit A'— Guaranteed Found
1254	The Harris Abbatoir Co., Ltd., Toronto.	"	" "	Fertilizer 'Exhibit A'— Guaranteed Found
1255	Ingersoll Packing Co. Ingersoll, Ont.	"	Blood, tankage and bone from the hog.	'Ingersoll Fertilizer'— Guaranteed Found
1256	The Nichols Chemical Co., Ltd., Capelton, P.Q.	"		'Capelton Brand'— Guaranteed Found
1257	" "	"		'The Royal Canadian'— Guaranteed Found
1258	" "	"	Phosphate rock, sulphuric acid, sulphate of ammonia and muriate of potash.	'The Victor'— Guaranteed Found
1259	" "	"		'The Reliance'— Guaranteed Found
1260	" "	"		'No. 1 Brand'— Guaranteed Found
1261	" "	"		'Our Crown Brand'— Guaranteed Found
1262	The American Agricultural Chemical Co., Great Eastern Fertilizer Branch, Rutland, Vt.	Great Eastern Fertilizer Branch, Rutland, Vt.		'Great Eastern Northern Corn Special'— Guaranteed Found
1263	" "	" "		'Great Eastern Potato Manure'— Guaranteed Found
1264	" "	" "		'Great Eastern General'— Guaranteed Found
1265	" "	" "		'Great Eastern Grass and Oats'— Guaranteed Found
1266	The American Agricultural Chemical Co., Bradley Fertilizer Works, Boston, Mass.	" "		'Plain Superphosphate'— Guaranteed Found

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Samples of Commercial Fertilizers, registered for 1902.

RESULTS OF ANALYSIS.										Relative value per ton of 2,000 lbs.	Number of Sample.
Nitrogen.		Phosphoric Acid.					Potash.	Moist- ure.			
Total; including that of Nitric Acid or Ammonia, if present.	Total; calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In- soluble.	Total.	Total Avail- able.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
2.06 2.46	2.50 2.97	6.00 5.20	2.00 3.95	1.00 1.30	9.00 10.45	8.00 9.15	1.50 2.45	..... 7.20	16.22 19.45	1250
3.29 3.99	4.00 4.84	6.00 8.45	2.00 2.04	1.00 1.25	9.00 11.74	8.00 10.49	7.00 6.80	..... 10.00	24.95 29.47	1251
10.46 6.78	12.70 8.23	1.10 3.99	8.60 4.82	6.70 3.99	16.40 12.80	9.70 8.81	Traces. 2.24	3.50 5.40	37.89 29.91	1252	
7.22 6.36	8.76 7.73	..... 0.96	..... 12.29	..... 2.04	17.06 15.29	..... 13.25	..... 0.65	7.22 7.58	..... 32.65	1253
7.52 8.14	9.13 9.89	..... 0.45	..... 4.54	..... 1.08	5.74 6.07	..... 4.99	..... 0.33	13.10 12.36	..... 26.50	1254
..... 6.41	9.60 7.80	..... Trace.	..... 10.68	..... 4.00	11.20 14.68	10.40 10.68	0.64 0.52	8.10 9.23	..... 31.68	1255
..... 0.29	..... 0.36	..... 8.95	..... 1.86	..... 4.48	..... 15.29	8.00 10.81	..... 1.00	..... 14.60	..... 15.90	1256
..... 4.01	4.00 4.87	..... 9.30	..... 0.60	..... 3.20	..... 13.10	9.00 9.90	5.00 6.64	..... 6.92	..... 29.37	1257
..... 2.58	2.00 3.13	..... 8.55	..... 1.30	..... 3.90	..... 13.75	7.00 9.85	3.00 4.58	..... 11.35	..... 24.86	1258
..... 2.48	2.00 3.01	..... 5.97	..... 1.74	..... 3.96	..... 11.67	6.00 7.71	2.00 3.44	..... 13.78	..... 19.84	1259
..... .....	..... .....	..... 11.83	..... 1.19	..... 3.20	..... 16.22	11.50 13.02	..... 0.46	..... 10.85	..... 16.96	1260
..... 3.20	2.00 3.89	..... 10.91	..... 1.50	..... 3.20	..... 15.61	11.00 12.41	2.50 3.46	..... 8.73	..... 27.00	1261
2.06 2.25	2.50 2.73	5.00 4.95	3.00 6.67	1.00 1.08	9.00 12.70	8.00 11.62	2.00 1.81	..... 10.50	16.41 20.90	1262
2.06 1.89	2.50 2.30	5.00 6.39	3.00 3.53	1.00 1.27	9.00 11.19	8.00 9.92	3.00 3.36	..... 10.25	17.99 20.00	1263
0.82 1.30	1.06 1.58	5.00 4.33	3.00 6.93	1.00 0.79	9.00 12.05	8.00 11.26	4.00 4.24	..... 10.40	16.07 20.63	1264
..... 0 0	11.00 7.00 3.71	1.00 1.44	12.00 12.15	11.00 10.71	2.00 2.57 13.30 15.61	1265	
.....	11.00 9.00	3.00 2.16	1.00 2.56	15.00 13.72	14.00 11.16 13.10	16.80 13.95	1266	

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TABLE I.—Statement of the Results of Examining 106 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name or Brand of Fertilizer.
1267	The American Agricultural Chemical Co., Great Eastern Fertilizer Branch, Rutland, Vt.	Manufacturers.....		'William & Clark's Americus Potato Manure'— Guaranteed Found
1268	" " ..	"		'William & Clark's Americus Corn Phosphate'— Guaranteed Found
1269	" " ..	"		'William & Clark's Royal Bone Phosphate for all Crops'— Guaranteed Found
1270	" " ..	"		'Pacific Potato Special'— Guaranteed Found
1271	" " ..	"		'Pacific Nobsque Guano'— Guaranteed Found
1272	" " ..	"		'Pacific Fine Ground Bone'— Guaranteed Found
1273	" " ..	"		'Soluble Pacific Guano'— Guaranteed Found
1274	" " ..	"		'Tucker's Imperial Bone Superphosphate'— Guaranteed Found
1275	" " ..	"		'Cleveland Fertilizer for all Crops'— Guaranteed Found
1276	" " ..	"		'Bradley's Eclipse Phosphate'— Guaranteed Found
1277	The American Agricultural Chemical Co., Bradley Fertilizer Works, Boston, Mass.	" "		'Bradley's XL Superphosphate'— Guaranteed Found
1278	" " ..	" "		'Bradley's Potato Fertilizer'— Guaranteed Found
1279	" " ..	" "		'Bradley's Farmer's New Method Fertilizer'— Guaranteed Found
1280	" " ..	" "		'Bradley's Niagara Phosphate'— Guaranteed Found
1281	" " ..	" "		'Bradley's Fine Ground Bone'— Guaranteed Found
1282	" " ..	" "		'Read's Leader Blood and Bone'— Guaranteed Found

SESSIONAL PAPER No. 14

Samples of Commercial Fertilizers, registered for 1902—*Continued.*

RESULTS OF ANALYSIS.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Number of Sample.
Total; including that of Nitric Acid or Ammonia, if present.	Total; calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.	
2.06 3.60	2.50 4.38	5.00 6.71	3.00 2.44	2.00 2.04	10.00 11.19	8.00 9.15	3.00 3.34	..... 13.50	17.99 23.67	1267
2.06 2.22	2.50 2.72	5.00 7.99	3.00 0.87	2.00 3.20	10.00 12.06	8.00 8.86	1.50 1.31	..... 13.40	16.41 18.22	1268
1.03 1.40	1.25 1.70	6.00 5.44	2.00 2.05	2.00 3.00	10.00 10.49	8.00 7.49	2.00 1.67	..... 15.00	14.67 14.79	1269
2.06 2.04	2.50 2.48	5.00 5.25	3.00 3.20	2.00 2.24	10.00 10.69	8.00 8.45	3.00 4.17	..... 14.05	17.99 19.77	1270
1.03 1.37	1.25 1.66	6.00 7.36	2.00 1.53	2.00 2.56	10.00 11.45	8.00 8.89	2.00 2.49	..... 14.90	14.67 17.18	1271
2.50 2.06	3.00 2.51	..... Trace.	..... 16.44	..... 7.99	21.00 24.43	..... 16.44	..... 0.29	..... 4.70	..... 31.31	1272
2.06 3.25	2.50 3.94	5.00 6.39	3.00 2.18	2.00 4.28	10.00 12.85	8.00 8.57	1.50 1.72	..... 13.25	16.41 20.96	1273
1.03 1.36	1.25 1.66	6.00 5.11	2.00 3.53	2.00 2.36	10.00 11.00	8.00 8.64	2.00 2.29	..... 12.95	14.67 16.38	1274
1.03 1.56	1.25 1.90	6.00 6.39	2.00 2.28	2.00 2.36	10.00 11.03	8.00 8.67	2.00 2.30	..... 10.85	14.67 17.05	1275
1.03 1.37	1.25 1.66	6.00 5.76	2.00 2.81	2.00 2.87	10.00 11.44	8.00 8.57	2.00 2.32	..... 16.15	14.67 16.59	1276
2.06 1.81	2.50 2.19	5.00 6.07	3.00 2.82	2.00 3.32	10.00 12.21	8.00 8.89	1.50 1.83	..... 12.20	16.41 17.64	1277
2.06 1.95	2.50 2.36	5.00 5.76	3.00 3.35	2.00 1.92	10.00 11.03	8.00 9.11	3.00 3.46	..... 13.85	17.99 19.48	1278
1.03 1.34	1.65 1.43	6.00 6.07	2.00 2.28	2.00 3.00	10.00 11.35	8.00 8.35	2.00 2.54	..... 15.45	14.67 17.58	1279
0.82 0.88	6.00 1.07	5.00 6.10	2.00 1.58	1.00 2.87	8.00 10.55	7.00 7.68	6.00 1.56	..... 15.70	11.52 13.67	1280
2.50 3.38	3.00 4.11	..... 0.00	..... 15.58	..... 9.46	21.00 25.04	..... 15.58	..... .....	..... .....	..... 34.71	1281
0.82 1.41	1.00 1.87	5.00 5.59	2.00 2.00	1.00 3.03	8.00 10.62	7.00 7.59	1.00 1.54	..... 14.65	11.52 14.82	1282

TABLE I.—Statement of the Results of Examining 106 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name or Brand of Fertilizer.
1283	The American Agricultural Chemical Co., Bradley Fertilizer Works, Boston, Mass.	Manufacturers ..	.....	'Read's Standard Superphosphate'— Guaranteed .. Found ..
1284	" "	" "	.....	'Read's Practical Potato Special'— Guaranteed .. Found ..
1285	" "	" "	.....	'Read's Farmer's Friend'— Guaranteed .. Found ..
1286	" "	" "	.....	'Read's Sure Catch Fertilizer'— Guaranteed .. Found ..
1287	" "	" "	.....	'Quinnipiac Potato Phosphate'— Guaranteed .. Found ..
1288	" "	" "	.....	'Quinnipiac Climax Phosphate for all Plants'— Guaranteed .. Found ..
1289	" "	" "	.....	'Quinnipiac Mohawk Fertilizer'— Guaranteed .. Found ..
1290	" "	" "	.....	'Cumberland Superphosphate'— Guaranteed .. Found ..
1291	" "	" "	.....	'Cumberland Potato Fertilizer'— Guaranteed .. Found ..
1292	" "	" "	.....	'Cumberland Fine Ground Bone'— Guaranteed .. Found ..
1293	Chemical Works, late H. & E. Albert, London, Eng.	"	.....	Thomas' Phosphate Powder— Guaranteed .. Found ..
1294	The Laing Packing and Provision Co., Ltd., Montreal.	"	..... Offal, bone and tank- age from the hog.	'Fertilizer'— Guaranteed .. Found ..
1295	The Provincial Chemical Fertilizer Co., St. John, N.B.	"	.....	'Imperial Superphosphate'— Guaranteed .. Found ..
1296	" "	" "	.....	'Potato Phosphate'— Guaranteed .. Found ..
1297	" "	" "	.....	'Victor Guano'— Guaranteed .. Found ..
1298	" "	" "	.....	'Fruit Tree Fertilizer'— Guaranteed .. Found ..
1299	" "	" "	.....	'Bone Meal'— Guaranteed .. Found ..

SESSIONAL PAPER No. 14

Samples of Commercial Fertilizers registered for 1902—Continued.

RESULT OF ANALYSIS.										Number of Sample.
Nitrogen.		Phosphoric Acid.					Potash.	Moist- ure.	Relative value per ton of 2,000 lbs.	
Total ; including that of Nitric Acid or Ammonia, if present.	Total ; calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In- soluble.	Total.	Total Avail- able.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	S cts.	
0·82 1·27	1·00 1·54	5·00 6·52	3·00 1·67	2·00 3·19	16·00 11·38	8·00 8·19	4·00 4·30	... 11·70	16 07 18 32	1283
0·82 1·76	1·00 2·14	2·00 4·00	2·00 2·75	1·00 2·39	5·00 9·14	4·00 6·75	8·00 7·82	..... 6·37	15 27 20 98	1284
2·06 2·20	2·50 2·70	5·00 7·67	3·00 0·97	2·00 2·55	10·00 11·19	8·00 8·64	3·00 3·03	..... 13·15	17 99 19 50	1285
..... 0·23	..... 0·28	6·00 6·87	4·00 3·21	1·00 2·07	11·00 12·15	10·00 10·08	2 00 2·51	..... 13·40	..... 15 58	1286
2·06 1·87	2·50 2 28	5·00 5·87	3·00 2·30	2·00 2·55	10·00 11·32	8·00 8·77	3·00 3·10	..... 13·55	17 99 18 75	1287
1·03 1·09	1·25 1·32	6·00 5·11	2·00 3·85	2·00 2·23	10·00 11·19	8·00 8·96	2·00 2·53	..... 13·90	14 67 16·32	1288
0·82 1·13	1·00 1·37	5·00 5·11	2·00 1·93	1·00 1·91	8·00 8·95	7·00 7·04	1·00 1·25	..... 16·05	11 52 12 84	1289
2·06 2·34	2·50 2·84	5·00 6·84	3·00 1·37	2·00 3 52	10·00 11·73	8·00 8·21	1 50 1·60	..... 13·80	16 41 18 08	1290
2·06 2·17	2·50 2·63	5·00 6·52	3·00 1·08	2·00 3·33	10·00 10·93	8·00 7·60	3·00 2·56	..... 14·30	17·99 17 91	1291
2·50 3·64	3·00 4·42	..... .....	..... 15·87	..... 8·19	21·00 24·06	..... 15·87	..... 0·21	..... 6 30	..... 34 61	1292
..... .....	..... .....	..... .....	..... 13·53	..... 4·13	17·00 17·66	..... 13·53	..... .....	..... 0·17	..... 17 77	1293
4·12 4·70	5·00 5·69	..... 1·00	..... 8·55	..... 3·53	14·71 13·08	..... 9·55	..... .....	5·52 5·75	..... 25 42	1294
2·31 2·39	2·80 2·90	..... 7·67	2·70 2·25	7·88 7·03	17·77 16·95	9·89 9·92	2·02 2·64	..... 9·55	..... 22 30	1295
2·80 2·50	3·40 3·03	..... 6·71	1·92 2·89	7·22 5·43	15·62 15·03	8·40 9·60	7·55 7·72	..... 7·20	..... 26 96	1296
1·77 2·56	2·15 3·11	..... 6·84	3 35 2·82	8·17 6·59	17·32 16·25	9·15 9·66	1·55 3·42	..... 9·85	..... 23 02	1297
..... 2·82	3·21 3·43	..... 7 35	3·54 2·56	3·83 5·44	14·07 15·35	6·70 9·91	5·77 4·69	..... 3·95	..... 24 96	1298
4·68 2·97	5·68 3·60	..... .....	..... 13·57	..... 6·07	24·28 19·64	..... 13·57	..... .....	..... 5·50	..... 28 13	1299

TABLE I.—Statement of the Results of Examining 106 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials produced.	Name or Brand of Fertilizers.
1300	W. Harris & Co., Danforth Ave., Toronto.	Manufacturers.....		Brand 'H'— Guaranteed Found
1301	" " ..	"		'Bone Meal'— Guaranteed..... Found
1302	The Standard Ferti- lizer and Chemical Co., Ltd., Smith's Falls, Ont.	"	Nitrate of soda, sulphate of am- monia, potash and magnesia salts, mineral superphos- phate, bone char and fine bone meal.	'Special Fertilizer'— Guaranteed... .. Found
1303	" " ..	"		'No. 1 Fertilizer'— Guaranteed.... Found
1304	" " ..	"		'Standard Fertilizer'— Guaranteed..... Found
1305	" " ..	"		'Corn and Grass Fertilizer'— Guaranteed..... Found
1306	" " ..	"		'Royal Fertilizer'— Guaranteed
1307	" " ..	"		Found
1307	" " ..	"	Made from mineral phosphate.	'Superphosphate of Lime'— Guaranteed.. .. Found
1308	" " ..	"		'Bone Meal'— Guaranteed..... Found
1309	" " ..	"		'Nitrate of Soda'— Guaranteed..... Found
1310	W. Faint, Peterboro', Ont.	"		'Bone Meal'— Guaranteed..... Found
1311	The Palmerston Pork Packing Co., Pal- merston, Ont.	"		'Tankage'— Guaranteed..... Found
1312	The W. A. Freeman Co., Ltd., Hamil- ton, Ont.	"		'Freeman's Pure Bone Meal'— Guaranteed..... Found
1313	" " ..	"		'Freeman's Sure Growth Manure'— Guaranteed..... Found
1314	" " ..	"		'Freeman's Potato Manure'— Guaranteed..... Found
1315	" " ..	"	Bone, tankage, blood, phos- phate, muriate of potash, sul- phate of pot- ash, nitrate of soda, sulphate of ammonia and sulphuric acid.	'Freeman's Bone and Potash'— Guaranteed..... Found
1316	" " ..	"		'Freeman's Celery and Early Vege- table Manure'— Guaranteed.... Found
1317	" " ..	"		'Freeman's Tankage Manure'— Guaranteed.. .. Found
1318	" " ..	"		'Freeman's Tobacco Manure' Guaranteed..... Found
1319	" " ..	"		'Freeman's Phosphate Powder'— Guaranteed..... Found

SESSIONAL PAPER No. 14

Samples of Commercial Fertilizers, registered for 1902—*Continued.*

RESULTS OF ANALYSIS.										Number of Sample.
Nitrogen.		Phosphoric Acid.					Potash.	Moist- ure.	Relative value per ton of 2,000 lbs.	
Total ; including that of Nitric Acid or Ammonia, if present.	Total; calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In- soluble.	Total.	Total avail- able.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	s. cts.	
6.02	8.68 7.31	1.27	7.66	3.19	9.11 12.12	9.11 8.93	0.65	8.21 1.95	28 27	1300
5.02	4.76 6.10		12.23	4.15	20.14 16.38	12.23	0.38	7.16 0.65	30 05	1301
3.32	3.50 4.04	8.12	0.90	1.28	10.06 10.30	8.00 9.02	6.00 7.39	9.20	26 85	1302
1.76	2.00 2.14	7.67	1.68	3.99	11.00 13.34	9.00 9.35	1.00 2.33	9.85	18 92	1303
2.67	2.50 3.24	9.72	1.16	1.91	11.00 12.79	9.00 10.88	2.00 2.78	8.95	22 84	1304
2.49	2.00 3.02	7.80	0.83	1.92	9.00 10.55	7.00 8.63	4.00 4.92	8.85	22 00	1305
1.64	2.00 1.98	8.13	1.91	1.92	9.00 11.96	8.00 10.04	3.00 3.95	7.65	20 54	1306
0.11	0.13	12.47	0.49	3.51	16.00 16.47	14.00 12.96		10.30	16 83	1307
4.22	4.00 5.13		16.32	5.43	22.00 21.75	16.32		6.50	33 51	1308
14.98	19.00 17.79							0.70	38 95	1309
5.06	6.15		9.92	10.88	20.80	9.92		6.65	33 93	1310
5.51	6.69	Trace.	10.83	2.60	13.43	10.83	1.04	3.00	28 83	1311
5.04	3.00 6.12		11.52	7.80	23.00 19.32	11.52	0.11	7.70	32 69	1312
4.00	3.50 4.86	5.44	2.38	3.84	8.00 11.66	7.82	3.00 5.79	9.20	25 98	1313
2.76	3.00 3.35	4.95	3.04	3.67	8.00 11.66	7.99	5.00 4.54	10.40	21 77	1314
2.60	2.00 3.16	5.59	1.30	3.67	9.00 10.56	6.89	6.00 6.50	10.50	22 31	1315
5.29	6.00 6.33	4.48	1.47	3.33	9.00 9.28	5.95	6.00 7.15	8.40	28 21	1316
5.44	5.00 6.61		9.91	2.24	12.00 12.15	9.91	Trace.	4.35	26 20	1317
5.81	6.00 7.05	5.25	2.23	2.24	7.00 9.72	7.48	7.00 7.15	8.75	30 87	1318
Trace.		12.60	0.19	3.97	15.00 16.76	12.79	Trace.	8.25	16 52	1319

TABLE I.—Statement of the Results of Examining 106 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name or Brand of Fertilizer.
1320	The American Agricultural Chemical Company.	Buffalo Sales Dept., Buffalo, N.Y.		'Crocker's Wheat and Corn Fertilizer'— Guaranteed..... Found
1321	"	"		'Crocker's Cabbage and Potato Manure'— Guaranteed..... Found
1322	"	"		'Crocker's Harvest Jewel Fertilizer'— Guaranteed.. . . . Found
1323	"	"		'Bradley's Complete Manure for potatoes and Vegetables'— Guaranteed... . . Found
1324	"	"		'Bradley's New Method Fertilizer'— Guaranteed..... Found
1325	"	"		'Bradley's B.D. Sea Fowl Guano'— Guaranteed..... Found
1326	Thos. Reid, St. John, N.B.	Manufacturers.....		'Superphosphate'— Guaranteed
1327	Bowker Fertilizer Co., 43 Chatham St., Boston, Mass.	" ..	Made from bone, bone black, phosphatic guano, bone phosphates, dried blood, meat or fish, sulphate of ammonia or nitrate of soda, sulphate of potash or muriate of potash and sulphuric acid.	Found
1328	"	"		'Fresh Ground Bone'— Guaranteed Found
1329	"	" ..		'Bowker's Farm and Garden Fertilizer'— Guaranteed
1330	"	" ..		Found
1331	"	" ..		'Bowker's Square Brand Bone and Potash Fertilizers'— Guaranteed
1332	Victoria Chemical Co., Ltd., Victoria, B.C.	Victoria Chemical Co., Ltd., Victoria, B.C.	Nitrate of soda, muriate of potash and superphosphate of lime.	Found
1333	"	" ..		'Bowker's Potato and Vegetable Fertilizer'— Guaranteed
1334	"	" ..	Muriate of potash and superphosphate of lime.	Found
1335	"	" ..	Treating spent bone char with sulphuric acid.	'Bowker's Vermont Fertilizer'— Guaranteed. Found Fertilizer 'A'— Guaranteed
				Found
				Fertilizer 'B'— Guaranteed
				Found
				Fertilizer 'C'— Guaranteed Found
				'Superphosphate of Lime'— Guaranteed. Found

SESSIONAL PAPER No. 14

Samples of Commercial Fertilizers, registered for 1902.—*Continued.*

RESULTS OF ANALYSIS.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative Value per Ton of 2,000 lbs.	Number of Sample.
Total; including that of Nitric Acid or Ammonia, if present.	Total; Calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	s. cts.	
2.06	2.50	6.00	2.00	1.00	9.00	8.00	1.50	.....	16 22	1320
2.53	3.08	6.71	2.08	1.28	10.07	8.79	2.22	9.50	18 91	
2.47	3.00	6.00	2.00	1.00	9.00	8.00	6.00	.....	21 92	1321
2.82	3.43	7.16	2.12	1.43	10.71	9.28	6.37	9.95	24 81	
1.65	2.00	6.00	2.00	1.00	9.00	8.00	2.00	.....	15 76	1322
2.06	2.49	7.03	3.20	0.64	10.87	10.23	2.06	10.20	19 25	
3.29	4.00	6.00	2.00	1.00	9.00	8.00	7.00	.....	24 95	1323
3.60	4.36	9.28	0.00	1.08	10.36	9.28	7.14	10.30	27 60	
0.82	1.00	6.00	2.00	1.00	9.00	8.00	2.00	.....	13 77	1324
1.29	1.56	7.16	1.92	1.28	10.36	9.08	1.73	9.50	16 06	
2.06	2.50	6.00	2.00	1.00	9.00	8.00	1.50	.....	16 22	1325
2.38	3.09	8.31	0.52	1.40	10.23	8.83	2.16	10.40	18 92	
2.41	2.92	2.23	6.60	3.32	12.15	8.83	2.62	18.05	19 47	1326
2.96	3.00	.....	22.50	3.32	24.00	22.50	.....	6.90	35 17	1327
1.53	2.00	5.25	2.31	3.64	10.00	8.00	2.00	.....	16 33	1328
2.10	2.00	2.56	3.58	5.76	12.00	6.00	2.00	.....	15 67	1329
1.90	2.00	5.25	1.41	4.60	11.00	9.00	2.00	.....	16 02	1330
2.70	3.00	6.40	0.95	3.33	10.00	8.00	4.00	.....	19 88	1331
4.00	4.84	11.20	.....	0.45	10.00	11.20	7.00	.....	32 41	1332
3.50	4.68	9.40	0.89	Trace.	9.00	11.00	11.00	.....	35 79	1333
0.77	0.93	12.47	0.96	Trace.	12.50	11.00	11.00	.....	29 97	1334
0.89	1.08	14.20	0.60	0.45	16.00	14.80	.....	10.55	20 43	1335

TABLE I.—Statement of the Results of Examining 106 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name or Brand of Fertilizer.
1336	Imported from Chili.	Victoria Chemical Co., Ltd., Victoria, B.C.		'Nitrate of Soda'— Guaranteed Found
1337	Imported from Germany.	" "		'Kainite'— Guaranteed Found
1338	" "	" "		'Sulphate of Potash'— Guaranteed Found
1339	" "	" "		'Muriate of Potash'— Guaranteed Found
1340	" "	" "		'Thomas Phosphate Powder'— Guaranteed Found
1341	F. D. Burris, Truro, N.S.	Manufacturer.....	Muriate of potash, nitrate of soda and dissolved bone, with black mud and plaster for a base.	'Potato Phosphate'— Guaranteed Found
1342	" "	"		'Bone Meal' (coarse ground)— Guaranteed Found
1343	Nova Scotia Fertilizer Co., Halifax, N.S.	Manufacturers.....	Bone char, bone, dried blood, tankage, bone phosphates, sulphate of ammonia, nitrate of soda, high grade muriate of potash or sulphate of potash and sulphuric acid.	'Cere's Superphosphate'— Guaranteed Found
1344	" "	"		'Apple Tree Phosphate'— Guaranteed Found
1345	" "	"		'Strawberry Phosphate'— Guaranteed Found
1346	" "	"		'Potato Phosphate'— Guaranteed Found
1347	" "	"		'Pure Ground Bone'— Guaranteed Found
1348	B. & M. Rattenbury, Charlottetown, P.E.I.	"		'Blood, Bone and Tankage'— Guaranteed Found
1349	" "	"		'Ground Bone'— Guaranteed Found
1350	The American Agricultural Chemical Co.	Buffalo Sales Dept., Buffalo, N.Y.		'Crocker's New York Special Fertilizer'— Guaranteed Found
1351	" "	" "		'Crocker's Dissolved Bone and Potash'— Guaranteed Found
1352	The Standard Fertilizer and Chemical Co., Smith's Falls, Ont.	Manufacturers	Mineral superphosphate of lime, sulphate of ammonia, potash salts and nitrate of soda.	'Star Brand'— Guaranteed Found

SESSIONAL PAPER No. 14

Samples of Commercial Fertilizers, registered for 1902 *Continued.*

RESULTS OF ANALYSIS.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Number of Sample.
Total; including that of Nitric Acid or Ammonia, if present.	Total; calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.	
16.00 15.62	18.97							1.25	49 32	1336
							12.00 14.40	14.40	15 12	1337
							50.00 44.96	1.00	53 00 47 21	1338
							50.00 44.40	4.80	53 00 46 62	1339
					16.00 17.59	12.03		0.35	17 12	1340
1.71	2.07	1.92	3.51	Trace.	5.43	5.43	5.81	11.95	16.56	1341
4.38	5.32		11.36	7.99	19.35	11.36		5.80	31.00	1342
1.89	2.00 2.30	5.11	2.92	3.00	9.20 11.03	8.03	2.14 2.97	9.85	17.90	1343
2.67	3.25 3.25	2.88	2.87	3.52	7.80 9.27	5.75	6.53 6.06	7.80	20.45	1344
1.75	2.02 2.12	4.16	1.27	3.53	8.30 8.96	5.43	6.50 6.12	4.22	18.08	1345
2.60	3.71 3.16	4.79	1.30	3.51	7.80 9.60	6.09	4.70 4.63	8.95	19.33	1346
3.33	4.53 4.04		11.18	11.98	22.66 23.16	11.18		8.95	32.25	1347
5.56	6.75		11.35	4.16	15.51	11.35	0.62	9.65	30.64	1348
1.61	2.06		19.20	6.39	25.59	19.20	1.62	16.75	33.07	1349
		8.00 10.87	2.00 0.93	1.00 1.44	11.00 13.24	10.00 11.80	8.00 8.32	6.45	20.50 23.23	1350
		8.00 10.23	2.00 1.93	1.00 1.72	11.00 13.88	10.00 12.16	2.00 3.45	12.95	14.20 18.54	1351
1.94	2.00 2.36	7.03	1.66	0.90	9.59	5.00 8.69	2.00 2.86	6.10	18.20	1352

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TABLE I.—Statement of the Results of Examining 106 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name or Brand of Fertilizer.
1353	The Leeds Phosphate Works, Leeds, Eng.	G. W. Campbell Arnott, Agent General in Canada, Toronto.	.....	'Thomas' Phosphate Flour'— Guaranteed Found
1356	Provincial Chemical Fertilizer Co., St. John, N.B			'Imperial Superphosphate'— Found
1357	" " ..			'Victor Guano'— Found

SESSIONAL PAPER No. 14

Samples of Commercial Fertilizers, registered for 1902—*Concluded.*

RESULTS OF ANALYSIS.										Number of Sample.
Nitrogen.		Phosphoric Acid.					Potash.	Moist- ure.	Relative value per ton of 2,000 lbs.	
Total; including that of Nitric Acid or Ammonia, if present.	Total; calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In- soluble.	Total.	Total avail- able.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.	
.....	.....	.....	10.69	7.92	18.00 18.61	10.69	.....	0.11	17.30	1353
2.82	3.43	10.04	1.95	5.76	17.75	11.99	2.20	10.80	25.00	1356
1.86	2.26	7.68	2.01	8.76	18.45	9.69	3.07	11.25	21.74	1357

TABLE II.—Result of the Examination of 85

Date of Collection.	No. of Sample.	NAME AND ADDRESS OF		Name or Brand of Fertilizer.	Nitrogen.		
		Vendor.	Manufacturer or Furnisher as given by Vendor.		Total; including that of Nitric Acid or Ammonia if present.	Total: calculated as Ammonia.	
1902.		<i>Halifax, N.S.</i>	<i>Analyst, M. Bowman, Halifax, N.S.</i>		p. c.	p. c.	
April 11	20215	A. L. Melvin.....	Provincial Chemical & Co., St. John, N.B.	'Potato Phosphate'— Guaranteed..... Standard sample.. Sample as sold.....	2·80 2·50 1·76	3·40 3·03 2·14	
"	11	20216	"	" ..	'Imperial Superphosphate'— Guaranteed... Standard sample.. Sample as sold.....	2·31 2·39 2·27	2·80 2·90 2·75
"	12	20217	F. T. De Wolfe... Bowker Fertilizer Co., Boston, Mass.	'Ground Bone'— Guaranteed... Standard sample.. Sample as sold....	 2·96 2·46	3·00 3·37 2·99	
"	12	20218	"	" ..	'Bone and Potash'— Guaranteed..... Standard sample.. Sample as sold.....	 2·10 1·76	2·00 2·55 2·14
		<i>Dartmouth, N.S.</i>					
	14	20219	E. M. Walker American Agricultural Chemical Co., Boston, Mass.	'Pacific Guano'— Guaranteed..... Standard sample.. Sample as sold.....	1·03 1·37 1·68	1·25 1·66 2·04	
	14	20220	"	" ..	'Potato Special'— Guaranteed..... Standard sample.. Sample as sold..	2·06 2·04 1·88	2·50 2·48 2·28
"	14	20221	Colin McNab..... Alberts Thomas Phosphate Co., London, Eng.	'Thomas' Phosphate Powder'— Guaranteed..... Standard sample.. Sample as sold.....	 	 	
		<i>Kentville, N.S.</i>					
"	15	20222	W. M. Carruthers. Russia Cement Co., Gloucester, Mass.	'Complete Manure for Corn, Grain and Grass'— Guaranteed..... Standard sample.. Sample as sold.....	 2·72	 3·30	
"	15	20223	" ..	" ..	'Complete Manure for Potatoes, Roots and Vegetables'— Guaranteed..... Standard sample.. Sample as sold.....	 3·14	 3·81
"	15	20224	C. O. Allen..... Nova Scotia Fertilizer Co., Halifax, N.S.	'Potato Phosphate'— Guaranteed..... Standard sample.. Sample as sold.....	 2·60 1·23	3·71 3·16 1·50	

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Samples of Fertilizers as sold in 1902.

RESULTS OF ANALYSIS.							Relative value per ton of 2,000 lbs	No. of Sample.	District Analyst's Remarks.
Phosphoric Acid.					Potash.	Moist- ure.			
Soluble in Water.	Citric Soluble.	In- soluble.	Total.	Total Avail- able.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
6.48	1.92	7.22	15.62	8.40	7.55	20215	Below guarantee except in available phosphoric acid.
6.71	2.89	5.43	15.03	9.60	7.72	7.20	26 96		
6.79	2.62	2.03	11.44	9.41	3.91	20.57	19 97	....
7.19	2.70	7.88	17.77	9.89	2.02	20216	Genuine.
7.67	2.25	7.03	16.95	9.92	2.64	9.55	22 30		
6.51	1.98	2.65	11.14	8.49	3.04	18.95	19 43	....
.....	24.00	20217	Deficient in available phos- phoric acid and therefore adulterated.
.....	22.50	3.32	25.82	22.50	.....	6.90	35 17	
0.40	11.75	13.08	25.23	12.15	.....	5.02	32 39	.....
.....	12.00	6.00	2.00	20218	Genuine.
2.56	3.58	5.76	11.90	6.14	1.80	9.95	15 67		
2.57	5.13	4.06	11.76	7.70	2.05	12.65	16 31	.....
6.00	2.00	2.00	10.00	8.00	2.00	14 67	20219	"
7.36	1.53	2.56	11.45	8.89	2.49	14.90	17 18		
6.01	2.88	1.33	10.22	8.89	1.49	12.07	16 38	..	
5.00	3.00	2.00	10.00	8.00	3.00	17 99	20220	"
5.25	3.20	2.24	10.69	8.45	4.17	14.05	19 77		
5.37	3.68	2.11	11.16	9.05	2.89	18.74	18 67	...	
.....	17.00	20221	"
.....	13.53	4.13	17.66	13.53	.....	0.17	17 77	
.....	12.38	4.49	16.87	12.38	...	0.40	16 76	...	
Not registered, therefore sold illegally.							20222	Not registered.
.....		
3.78	4.69	2.05	10.52	8.47	9.57	10.17	26 90	.....
Not registered, therefore sold illegally.							20223	Not registered.
.....		
3.66	4.06	3.89	11.61	7.72	8.92	6.91	26 94	.....
.....	7.80	4.70	20224	Below guarantee in nitrogen and potash, and therefore adulterated.
4.79	1.30	3.51	9.60	6.09	4.63	8.95	19 33		
2.87	3.44	2.25	8.56	6.31	3.65	14.77	14 68	....

TABLE II.—Results of the Examination of 85

Date of Collection.	No. of Sample.	NAME AND ADDRESS OF		Name or Brand of Fertilizer.	Nitrogen.		
		Vendor.	Manufacturer or Furnisher as given by Vendor.		Total; including that of Nitric Acid or Ammonia if present.	Total; calculated as Ammonia.	
					p. c.	p. c.	
1902.		Quebec.	Analyst, Dr. M. Fisct, Quebec.				
April 3	23307	P. T. Legare.....	The Nichols Chemical Co., Capelton, Que.	'Reliance'— Guaranteed Standard sample Sample as sold ...	..... 2·48 2·27	2·00 3·01 2·76
" 3	23308	"	"	'Superphosphate No. 1'— Guaranteed Standard sample Sample as sold .....	..... ..... 0·19	..... ..... 0·23
" 3	23309	"	"	'Royal Canadian'— Guaranteed Standard sample Sample as sold .....	..... 4·01 2·88	4·00 4·87 3·50
" 3	23310	"	"	'The Victor'— Guaranteed Standard sample Sample as sold .....	..... 2·58 2·47	2·00 3·13 3·00
" 3	23311	J. B. Renaud & Co. Ottawa.	Provincial Chemical Fertilizer Co., St. John, N.B.	'Victor Guano'— Guaranteed Standard sample Sample as sold	1·77 2·56 1·65	2·15 2·11 2·00	
" 21	22623	Graham Bros... .. Brockville, Ont.	Standard Fertilizer Co., Smith's Falls, Ont.	'Bone Meal'— Guaranteed Standard sample Sample as sold .	..... 4·22 3·76	4·00 5·13 4·56
" 22	22624	Brown & Sons	American Agricultural Chemical Co., Boston, Mass.	'Potato Fertilizer'— Guaranteed Standard sample Sample as sold	2·06 1·95 2·31	2·50 2·36 2·80	
" 22	22625	"	"	'B. D. Sea Fowl Guano'— Guaranteed Standard sample Sample as sold	2·06 2·38 2·03	2·50 3·09 2·46	
" 22	22626	"	"	'Complete Manure for Potatoes and Vegetables'— Guaranteed Standard sample Sample as sold	3·29 3·60 2·67	4·00 4·36 3·25	
" 22	22627	"	"	'New Method Fertilizer'— Guaranteed Standard sample Sample as sold	1·03 1·34 1·05	1·25 1·63 1·28	

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Samples of Fertilizers as sold in 1902—*Continued.*

RESULTS OF ANALYSIS.								No. of Sample.	District Analyst's Remarks.
Phosphoric Acid.									
Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.	Potash.	Moisture.	Relative value per ton of 2,000 lbs		
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
5.97	1.74	3.96	11.67	6.00	2.00	13.78	19.84	23307	Genuine and up to guarantee.
5.11	2.88	4.32	12.31	7.71	3.44	14.17	19.79		
11.83	1.19	3.20	16.22	11.50		10.85	16.96	23308	
9.27	1.92	4.80	15.99	13.02	0.46	12.85	15.22		
9.30	0.60	3.20	13.10	9.00	5.00	6.92	29.37	23309	Genuine but below guarantee in ammonia and potash.
9.43	2.62	3.20	15.25	9.90	6.64	12.00	26.35		
8.55	1.30	3.90	13.75	7.00	3.60	11.35	24.86	23310	Genuine and up to guarantee.
6.56	3.36	3.35	13.27	9.85	4.58	14.55	23.68		
6.84	3.35	8.17	17.32	9.15	1.55	9.85	23.02	23311	
4.80	2.82	6.59	16.25	9.66	3.42	13.50	19.98		
	4.79	8.31	17.90	9.59	1.58				
			22.00					22623	
	16.32	5.43	21.75	16.32		6.50	33.51		
	12.95	10.23	23.18	12.95		6.93	33.50		
5.00	3.00	2.00	10.00	8.00	3.00		17.99	22624	
5.76	3.35	1.92	11.03	11.00	3.46	13.85	19.48		
6.65	3.47	2.19	12.31	10.12	4.03	9.88	23.43		
6.00	2.00	1.00	9.00	8.00	1.50		16.22	22625	
8.31	0.52	1.40	10.23	8.83	2.16	10.40	18.92		
6.50	2.94	2.39	11.83	9.44	1.83	7.00	18.54		
6.00	2.00	1.00	9.00	8.00	7.00		24.95	22626	
9.28	0.00	1.08	10.36	9.28	7.14	10.30	27.60		Genuine but below guarantee in ammonia and potash.
8.00	2.55	1.92	12.47	10.55	6.10	9.93	19.40		
6.00	2.00	2.00	11.00	8.00	2.00		14.67	22627	Genuine and up to guarantee.
6.07	2.28	3.00	11.35	8.35	2.54	15.45	17.58		
7.45	2.15	2.07	11.67	9.60	2.97	7.68	17.55		

TABLE II.—Results of the Examination of 85

Date of Collection.	No. of Sample.	NAME AND ADDRESS OF		Name or Brand of Fertilizer.	Nitrogen.	
		Vendor.	Manufacturer or Furnisher as given by Vendor.		Total; including that of Nitric Acid or Ammonia if present.	Total; calculated as Ammonia.
					p. c.	p. c.
1902.		Richmond, P.Q.	Analyst, A. L. Tourchot, St. Hyacinthe, P.Q.			
April	2	23301 D. Taylor...	Standard Fertilizer and Chemical Co., Smith's Falls, Ont.	'Special'— Guaranteed Standard sample Sample as sold	3.32 3.09	3.50 4.04 3.75
	2	23302 "	" "	'Superphosphate of Lime'— Guaranteed Standard sample Sample as sold	0.11	0.13
	2	23304 M. Steele & Co. . .	Nichols Chemical Co., Capelton, P.Q.	'Victor'— Guaranteed Standard sample Sample as sold	2.58 1.90	2.00 3.13 2.31
	2	23305 "	" "	'Capelton'— Guaranteed Standard sample Sample as sold	0.29	0.36
	2	23306 D Taylor	Standard Fertilizer and Chemical Co., Smith's Falls, Ont.	'Standard'— Guaranteed Standard sample Sample as sold	2.67 2.27	2.50 3.24 2.75
	8	23312 E. Payne, Granby.	American Agricultural Fertilizer Co., Boston, Mass.	'Bradley's Eclipse Phosphate for all crops'— Guaranteed Standard sample Sample as sold	1.03 1.37 1.40	1.25 1.66 1.70
		Knowlton, P.Q.				
	9	23313 C. W. Beals	" "	'Bradley's Eclipse Phosphate for all crops'— Guaranteed Standard sample Sample as sold	1.03 1.37 1.37	1.25 1.66 1.66
		Mayog, P.Q.				
"	10	23314 F. W. Wallace, Mary St.	Bowker Fertilizer Co., Boston, Mass.	'Bowker's Corn Phosphate'— Guaranteed Standard sample Sample as sold	1.44	1.75
	10	23315 "	" "	'Bowker's Potato and Vegetable Phosphate'— Guaranteed Standard sample Sample as sold	1.90 1.58	2.00 2.31 1.92
		Spencerville, Ont.				
	10	22621 A. Millar	The Nichols Chemical Co., Capelton, P.Q.	'The Victor'— Guaranteed Standard sample Sample as sold	2.58 2.58	2.00 3.13 3.13
		Ottawa.				
"	21	22622 Graham Bros.	W. A. Freeman Co., Hamilton, Ont.	'Tankage'— Guaranteed Standard sample Sample as sold	5.44 6.30	5.00 6.61 7.65

SESSIONAL PAPER No. 14

Samples of Fertilizers as sold in 1902 — *Continued.*

RESULTS OF ANALYSIS.								No. of Sample.	District Analyst's Remarks.
Phosphoric Acid.					Potash.	Moist- ure.	Relative value per ton of 2,000 lbs		
Soluble in Water.	Citric soluble.	In- soluble.	Total.	Total Avail- able.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	S. cts.		
			10.00	8.00	6.00			23301	Up to guarantee.
8.12	0.90	1.28	10.30	9.02	7.39	9.20	26.85		
7.93	1.73	1.09	10.75	9.66	5.64	10.01	25.09		
			16.00	14.00				23302	
12.47	0.49	3.51	16.47	12.96		10.30	16.83		
12.16	2.49	2.24	16.89	14.65		13.65	18.00		"
				7.00	3.00			23304	
8.55	1.30	3.90	13.75	9.85	4.58	11.35	24.86		
6.91	3.52	2.94	13.37	10.43	3.09	12.98	20.85		
				8.00				23305	
8.95	1.86	4.48	15.29	10.81	1.00	14.60	15.90		
7.90	1.64	5.05	14.59	9.54		13.58	12.80		"
			11.00	9.00	2.00			23306	
9.72	1.16	1.91	12.79	10.88	2.78	8.95	22.84		
8.70	1.98	1.79	12.47	10.68	2.63	11.66	21.37		"
6.00	2.00	2.00	10.00	8.00	2.00		14.67	23312	
5.76	2.81	2.87	11.44	8.57	2.32	16.15	16.59		
5.60	2.26	2.69	10.55	7.86	2.53	14.64	16.03		"
6.00	2.00	2.00	10.00	8.00	2.00		14.67	23313	
5.76	2.81	2.87	11.44	8.57	2.32	16.15	16.59		
5.60	2.33	2.18	10.11	7.93	2.55	15.16	15.89		"
Not registered by this name.									
								23314	
5.31	2.69	3.32	11.32	8.00	2.32	16.08	16.23		"
			11.00	9.00	2.00			23315	
5.25	1.41	4.60	11.26	6.66	2.12	9.60	16.02		
5.40	2.57	3.84	11.81	7.97	2.32	15.94	16.69		"
				7.00	3.00			22621	
8.55	1.30	3.90	13.75	9.85	4.58	11.35	24.86		
7.89	1.71	3.52	13.12	9.60	4.60	10.18	23.63		"
			12.00					22622	
	9.91	2.24	12.15	9.91	Trace.	4.35			
0.13	6.76	4.16	11.05	6.89		6.10	26.88		

TABLE II.—Results of the Examination of 85

NAME AND ADDRESS OF					Nitrogen.	
Date of Collection.	No. of Sample.	Vendor.	Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Total; including that of Nitric Acid or Ammonia if present.	Total; calculated as Ammonia.
1902.		Montreal.	Analyst, J. T. Donald, Montreal.		p. c.	p. c.
Mch. 21	21212	Laing Packing & Provision Co.	Vendors	'Laing Fertilizer'— Guaranteed. Standard sample. Sample as sold.	4.12 4.70 5.48	5.00 5.69 6.66
" 21	21213	Montreal Union Abattoir Co.	"	'Tankage'— Guaranteed. Standard sample. Sample as sold.	 7.86	 9.55
" 22	21214	Brodie & Harvie, Bleury street.	Standard Fertilizer Co., Smith's Falls, Ont.	'Special'— Guaranteed. Standard sample. Sample as sold.	 3.32 3.02	3.50 4.04 3.67
" 24	21215	R. J. Latimer, 144 McGill street.	Nichols Chemical Co., Capelton, P.Q.	'Victor'— Guaranteed. Standard sample. Sample as sold.	 2.58 2.46	2.00 3.13 2.99
" 24	21216	" " ..	" " ..	'Capelton'— Guaranteed. Standard sample. Sample as sold.	 0.29 0.24	 0.36 0.29
" 24	21217	" " ..	" " ..	'Royal Canadian'— Guaranteed. Standard sample. Sample as sold.	 4.01 2.32	4.00 4.87 2.81
" 24	21218	" " ..	" " ..	'No. 1'— Guaranteed. Standard sample. Sample as sold.	 0.36	 0.43
		Hurdman's, P.Q.				
April 8	21219	Thos. Cogland....	Bowker Fertilizer Co., Boston, Mass.	'Vermont Phosphate'— Guaranteed. Standard sample. Sample as sold.	 2.70 2.53	3.00 3.28 3.07
" 8	21220	" ..	" ..	'Potato and Vegetable'— Guaranteed. Standard sample. Sample as sold.	 1.90 1.59	2.00 2.31 1.93
" 8	21221	Wm. Anderson...	American Agricultural Fertilizer Co., Boston, Mass.	'Eclipse Phosphate'— Guaranteed. Standard sample. Sample as sold.	1.03 1.37 1.36	1.25 1.66 1.65
		Smith's Falls, Ont.	Analyst, Dr. F. X. Valade, Ottawa.			
Mar. 13	22601	The Standard Fertilizer Co., Smith's Falls, Ont.	Vendors.....	'No. 1 Brand'— Guaranteed. Standard Sample. Sample as sold.	 1.76 2.17	2.00 2.14 2.64
" 13	22602	" ..	" ..	'Corn and Grass'— Guaranteed. Standard sample. Sample as sold.	 2.49 1.96	2.00 3.02 2.38
" 13	22603	" ..	" ..	'Special'— Guaranteed. Standard sample. Sample as sold.	 3.32 3.08	3.50 4.04 3.74

SESSIONAL PAPER No. 14

Samples of Fertilizers as sold in 1902 *Continued.*

RESULTS OF ANALYSES.								No. of Sample.	District Analyst's Remarks.
Phosphoric Acid.									
Soluble in Water.	Citric soluble.	In-soluble.	Total.	Total Available.	Potash.	Mois-ture.	Relative value per ton of 2,000 lbs.		
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	s cts.		
1.00	8.55	3.53	14.71	9.55		5.75	25 42	21212	Above guaranteed value.
	13.56	1.93	13.08	13.56	0.04	6.08	30 04		
Not registered for 1902, therefore sold illegally.								21213	
Heavy traces.	1.98	0.33	2.31	1.98	0.30	16.81	21 68		Genuine.
			10.00	8.00	6.00			21214	
8.12	0.90	1.28	10.30	9.02	7.39	9.20	26 85		Above guaranteed value.
8.37	0.49	1.30	10.16	8.86	6.57	9.02	25 12		
				7.00	3.00			21215	Above guarantee in ammonia and under guarantee in available phosphoric acid and potash.
8.55	1.30	3.90	13.75	9.85	4.58	11.35	24 86		
4.88	1.40	3.96	10.24	6.28	2.29	12.60	16 89		
				8.00				21216	Below guarantee in available phosphoric acid.
8.95	1.86	4.48	15.29	10.81	1.00	14.60	15 90		
4.94	1.43	5.19	11.56	6.37	0.18	12.77	9 83		
				9.00	5.00			21217	Under guarantee in ammonia and available phosphoric acid.
9.30	0.60	3.20	13.10	9.90	6.64	6.92	29 37		
7.17	0.79	3.52	11.48	7.96	4.75	11.64	20 11		
				11.50				21218	Below guarantee in available phosphoric acid, and therefore adulterated.
11.83	1.19	3.20	16.22	13.02	0.46	10.85	16 96		
7.37	1.17	5.04	13.58	8.54	0.16	13.85	12 67		
			10.00	8.00	4.00			21219	Fully up to guarantee.
6.40	0.95	3.33	10.68	7.35	3.49	5.50	19 88		
4.46	4.74	2.06	11.26	9.20	4.32	15.09	21 79		
			11.00	9.00	2.00			21220	Slightly under guarantee in available phosphoric acid and slightly over guarantee in potash.
5.25	1.41	4.60	11.26	6.66	2.12	9.60	16 02		
5.14	2.97	2.81	10.92	8.11	2.17	15.70	16 38		
			10.00	8.00	2.00		14 67	21221	Fully up to guarantee.
6.00	2.00	2.00	10.00	8.00	2.32	16.15	16 59		
5.76	2.81	2.87	11.44	8.57	2.11	13.62	15 39		
4.96	2.95	3.04	10.95	7.91					
			11.00	9.00	1.00			22601	Genuine.
7.67	1.68	3.99	13.34	9.35	2.33	9.85	18 92		
8.68	1.20	1.48	11.36	9.88	1.37	13.64	18 83		
			9.00	7.00	4.00			22602	"
7.80	0.83	1.92	10.55	8.63	4.92	8.85	22 00		
6.68	1.04	1.62	9.34	7.72	3.00	13.93	17 50		
			10.00	8.00	6.00			22603	"
8.12	0.90	1.28	10.30	9.02	7.39	9.20	26 85		
7.20	1.28	1.84	10.32	8.48	5.88	10.42	24 16		

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TABLE II.—Results of the Examination of 85

Date of Collection.	No. of Sample.	NAME AND ADDRESS OF		Name or Brand of Fertilizer.	Nitrogen.	
		Vendor.	Manufacturer or Furnisher as given by Vendor.		Total ; including that of Nitric Acid or Am- monia if present.	Total ; calculat- ed as Am- monia.
1902.		Smith's Falls, Ont. Analyst, Dr. F. X. Valade, Ottawa.			p. c.	p. c.
Mar. 13	22604	The Standard Fer- tilizer Co., Smith's Falls, Ont.	Vendors	'Standard'— Guaranteed Standard sample Sample as sold		2·50 3·24 2·89
" 13	22605	"	"	'Royal'— Guaranteed Standard sample Sample as sold		2·00 1·98 2·04
" 13	22606	"	"	'Superphosphate'— Guaranteed Standard sample Sample as sold		0·13 0·85
		Spencerville, Ont.				
" 27	22617	Mr. Smailie, Farmer.	The American Agri- cultural Chemical Co., Boston, Mass.	'"B. D." Sea Fowl Guano'— Guaranteed Standard sample Sample as sold		2·50 3·09 3·23
" 27	22618	"	"	'Bradley's Potato Fertilizer'— Guaranteed Standard sample Sample as sold		2·50 2·36 2·38
" 27	22619	"	"	'Bradley's Farmers' New Method'— Guaranteed Standard sample Sample as sold		1·25 1·63 2·89
		Belleville, Ont. Analyst, Dr. W. H. Ellis, Toronto.				
Mar. 14	22607	The Belleville Can- ning Co.	The American Agri- cultural Chemical Co., Boston, Mass.	'Dissolved Bone and Potash'— Guaranteed Standard sample Sample as sold		2·42
		Toronto.				
" 15	22608	The Steele, Briggs Co., King's St.	Furnished by A. Boyd, Toronto.	'Nitrate of Soda'— Guaranteed Standard sample Sample as sold		19·73
" 15	22609	"	Harris & Co., Toron- to.	'Bone Meal'— Guaranteed Standard sample Sample as sold		4·76 6·10 6·01
" 15	22610	W. Rennie, seed merchant.	W. A. Freeman Com- pany, Hamilton, Ont.	'Bone Meal'— Guaranteed Standard sample Sample as sold		3·00 6·12 6·46
" 15	22611	"	"	'Thomas Phosphate'— Guaranteed Standard sample Sample as sold		

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Samples of Fertilizers as sold in 1902.—*Continued.*

RESULTS OF ANALYSES.								No. of Sample.	District Analyst's Remarks.
Phosphoric Acid.					Potash.	Moist- ure.	Relative value per ton of 2,000 lbs		
Soluble in Water.	Citric Soluble.	In- soluble.	Total.	Total Avail- able.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	s. cts.		
			11.00	9.00	2.00			22604	
9.72	1.16	1.91	12.79	10.88	2.78	8.95	22 84		
8.72	0.86	1.08	10.66	9.58	2.20	11.31	19 75	.....	Genuine.
			9.00	8.00	3.00			22605	
8.13	1.91	1.92	11.96	10.04	3.95	7.65	20 54		
7.06	0.96	1.14	9.16	8.02	3.20	5.02	17 26	.....	"
			16.00	14.00				22606	
12.47	0.49	3.51	16.47	12.96		10.30	16 83		
12.80	1.62	1.76	16.18	14.42	0.63	6.67	18 63	.....
								22617	
6.00	2.00	1.00	9.00	8.00	1.50		16 22		
8.31	0.52	1.40	10.23	8.83	2.16	10.40	18 92		
4.12	0.80	4.30	9.22	4.92	2.63	15.59	16 25	.....	Adulterated, being below guarantee in available phosphoric acid.
								22618	
5.00	3.00	2.00	10.00	8.00	3.00		17 99		
5.76	3.35	1.92	11.03	9.11	3.46	13.85	19 48		
4.96	2.16	3.72	10.84	7.12	4.04	12.73	18 39		Genuine, though a trifle low in available phosphoric acid.
								22619	
6.00	2.00	2.00	10.00	8.00	2.00		14 67		
6.07	2.28	3.00	11.35	8.35	2.54	15.45	16 58		
4.88	2.16	3.84	10.88	7.04	4.66	15.85	17 99	.....	Genuine, though below guarantee in available phosphoric acid.
								22607	
8.00	2.00	1.00	11.00	10.00	2.00				
4.46	6.11	1.60	12.67	11.07	2.32	6.84	20 32		
Not registered.								22608	
						0.26	42 25	.....	Not registered.
								22609	
0.00	12.23	4.15	20.14			7.16			
3.75	9.55	5.00	16.38	12.23	0.38	0.65	30 05		
			18.30	13.30		2.79	31 89	.....	Up to standard.
								22610	
	11.52	7.80	23.00						
	13.71	1.37	19.32	11.52	0.11	7.70	32 69		
1.12			16.20	14.83		3.74	30 56	...	Up to standard but below guarantee in phosphoric acid.
								22611	
0.00	13.53	4.13	17.00						
			17.66	13.53		0.17	17 77		
1.79	12.56	1.95	16.30	14.35		0.45	17 34	.....	Up to standard.

TABLE II.—Result of the Examination of 85

Date of Collection.	No. of Sample.	NAME AND ADDRESS OF		Name of Brand of Fertilizer.	Nitrogen.	
		Vendor.	Manufacturer or Furnisher as given by Vendor.		Total; including that of Nitric Acid or Ammonia if present.	Total; calculated as Ammonia.
					p. c.	p. c.
1902.		Toronto.	Analyst, Dr. W. H. Ellis, Toronto.			
Mar. 15	22612	W. Rennie, seed merchant.	Wm. Faint, Peterboro', Ont.	'Bone Meal'— Guaranteed..... Standard sample Sample as sold	5.06 3.95	6.15 4.80
15	22613	J. A. Simmers, seed merchant, King St.	W. A. Freeman Company, Hamilton, Ont.	'Celery and Early Vegetables'— Guaranteed..... Standard sample Sample as sold	5.29 3.24	6.00 6.33 3.94
" 15	22614	"	"	'Potato Manure'— Guaranteed..... Standard sample Sample as sold	2.76 2.83	3.00 3.35 3.40
" 15	22615	"	"	'Lawn Fertilizer' Guaranteed..... Standard sample Sample as sold	0.92	1.10
15	22616	"	"	'Sure Growth'— Guaranteed..... Standard sample Sample as sold	4.00 4.27	3.50 4.86 5.22
		Hamilton, Ont.	Analyst, F. T. Harrison, London, Ont.			
18	22023	W. A. Freeman Co.	Vendors	'Sure Growth'— Guaranteed..... Standard sample .. Sample as sold.....	4.00 4.22	3.50 4.86 5.12
18	22024	"	"	'Bone Meal'— Guaranteed..... Standard sample Sample as sold	5.04 4.64	3.00 6.12 5.64
18	22025	Thos. S. Morris, 45 Wellington St St. Catharines.		'Thomas' Phosphate'— Guaranteed... Standard sample Sample as sold		
19	22027	Tetterington & Co. Ingersoll, Ont.	The American Agricultural Chemical Co., Boston, Mass.	'Guano'— Guaranteed..... Standard sample Sample as sold	2.06 3.25 2.53	2.50 3.94 3.07
20	22028	Robertson & McKay.	"	'Potato Fertilizer'— Guaranteed... Standard sample Sample as sold	2.06 1.95 2.67	2.50 2.36 3.24
20	22029	"	"	'New Method'— Guaranteed..... Standard sample Sample as sold	1.03 1.34 1.62	1.25 1.63 1.96

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Samples of Fertilizers as sold in 1902 *Continued.*

RESULTS OF ANALYSES.								No. of Sample.	District Analyst's Remarks.
Phosphoric Acid.									
Soluble in Water.	Citric Soluble.	In- soluble.	Total.	Total Avail- able.	Potash.	Moist- ure.	Relative value per ton of 2,000 lbs		
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
No guarantee given.....								22612	
.....	9.92	10.88	20.80	9.92	.....	6.65	33 93		
2.43	11.12	9.50	23.05	13.55	.....	4.78	34 13	.....	Not guaranteed.
.....								22613	
4.48	1.47	3.33	9.00	.....	6.00	.....	.....
3.35	5.58	2.97	9.28	5.95	7.15	8.40	28 21	.....	Up to guarantee in phos- phoric acid and potash, below guarantee in am- monia.
.....	.....	.....	11.90	8.93	6.55	7.26	25 71	.....
.....								22614	
4.95	3.04	3.67	8.00	.....	5.00	.....	.....
2.87	15.48	3.45	11.66	7.99	4.54	10.40	21 77	.....	Up to standard and guar- antee.
Not regi stered.								22615	
8.77	2.95	0.98	12.70	11.72	3.35	7.34	19 80	.....	Not registered.
.....								22616	
5.44	2.38	3.84	8.00	.....	3.00	.....	.....
5.05	5.40	4.05	11.66	7.82	5.79	9.20	25 98	.....	Up to standard and guar- antee.
.....	.....	.....	14.50	10.45	2.16	5.47	25 74	.....
.....								22023	
5.44	2.38	3.84	8.00	.....	3.00	.....	.....
5.52	0.68	4.80	11.66	7.82	5.79	9.20	25 98	.....	Unadulterated.
.....	.....	.....	11.00	6.20	2.60	13.17	19 27	.....
.....								22024	
.....	11.52	7.80	23.00	.....	.....	.....	.....
.....	8.26	12.02	19.32	11.52	0.11	7.70	32 69	.....	Adulterated in that it is deficient in phosphoric acid.
.....	.....	.....	20.28	8.26	.....	6.47	32 25	.....
.....								22025	
.....	13.53	4.13	17.00	.....	.....	.....	.....
.....	13.49	4.10	17.66	13.53	.....	0.17	17 77	.....	Unadulterated,
.....	.....	.....	17.59	13.49	.....	0.20	17 70	.....
.....								22027	
5.00	3.00	2.00	10.00	8.00	1.50	.....	16 41		
6.39	2.18	4.28	12.85	8.57	1.72	13.25	20 96	.....
6.23	2.15	4.54	12.92	8.38	2.56	8.05	19 97	.....	"
.....								22028	
5.00	3.00	2.00	10.00	8.00	3.00	.....	17 99		
5.76	3.35	1.92	11.03	9.11	3.46	13.85	19 48	.....
8.31	0.58	1.98	10.87	8.89	2.62	12.90	20 56	.....	"
.....								22029	
6.00	2.00	2.00	11.00	8.00	2.00	.....	14 67		
6.07	2.28	3.00	11.35	8.35	2.54	15.45	16 58	.....
4.80	4.09	1.21	10.10	8.89	2.29	10.56	16 92	.....	"

TABLE II.—Results of the Examination of 85

Date of Collection.	No. of Sample.	NAME AND ADDRESS OF		Name or Brand of Fertilizer.	Nitrogen.	
		Vendor.	Manufacturer or Furnisher as given by Vendor.		Total; including that of Nitric Acid or Ammonia if present.	Total; calculated as Ammonia.
					p. c.	p. c.
1902.		<i>Ingersoll, Ont.</i>	<i>Analyst, F. T. Harrison, London, Ont.</i>			
Mar. 20	22030	Ingersoll Packing Co. <i>London, Ont.</i>	Vendors.....	'Ingersoll Fertilizer'— Guaranteed..... Standard sample..... Sample as sold.....	 6.41 7.81	 9.60 7.80 9.48
"	22	22031 J. H. McMeechen.	".....	'Tankage'— Guaranteed... Standard sample..... Sample as sold.....	 10.28	 12.39
"	22	22032 Darch & Hunter, Seed Merchants. <i>St. John, N.B.</i>	Michigan Carbon Works. <i>Analyst, E. B. Kenrick, Winnipeg.</i>	'Bone Dust'— Guaranteed..... Standard sample..... Sample as sold.....	 1.62	 1.96
"	18	17836 The Provincial Chemical Fertilizer Co.	Vendors.....	'Bone Meal'— Guaranteed... .. Standard sample..... Sample as sold.....	 4.68 2.97 4.18	 5.68 3.60 5.07
"	19	17837 C. H. Peters & Sons, Walker's Wharf. <i>Sussex, N.B.</i>	Bradley Fertilizer Co., Boston.	'Potato Fertilizer'— Guaranteed..... Standard sample..... Sample as sold.....	 2.06 1.95 2.35	 2.50 2.36 2.85
"	20	17838 W. B. McKay & Co.	Bowker Fertilizer Co., Boston.	'Potato and Vegetable'— Guaranteed..... Standard sample..... Sample as sold.....	 1.90 1.90	 2.00 2.31 2.31
"	20	17839 J. A. Humphreys. <i>St. Andrew's, N.B.</i>	Nova Scotia Fertilizer Co., Halifax, N.S.	'Ceres Superphosphate'— Guaranteed... .. Standard sample..... Sample as sold.....	 1.89 1.37	 2.00 2.30 1.66
"	25	17840 G. D. Grimmer... <i>St. Stephen, N.B.</i>	Lowell Fertilizer Co., Lowell, Mass., U.S.A.	'Swift's Lowell Bone Fertilizer'— Guaranteed..... Standard sample..... Sample as sold.....	 1.04	 1.26
"	26	17841 F. E. Rose <i>Woodstock, N.B.</i>	E. Frank Coe Co., Front St., New York.	'Ammoniated Bone'— Guaranteed... .. Standard sample..... Sample as sold.....	 1.43	 1.74
"	27	17842 Batmain Bros..... <i>Fredericton, N.B.</i>	New England Fertilizer Co., Boston, Mass.	'Seeding Down Fertilizer'— Guaranteed... .. Standard sample..... Sample as sold.....	 1.23	 1.49
"	29	17843 J. F. Van Buskirk	American Agricultural Fertilizer Co. Boston, Mass.	'Quinnipiac Climax Phosphate'— Guaranteed..... Standard sample..... Sample as sold.....	 1.03 1.09 1.23	 1.25 1.32 1.49

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Samples of Fertilizers as sold in 1902—*Continued.*

RESULTS OF ANALYSIS.								No. of Sample.	District Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs.		
Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
Trace...	10.68	4.00	11.20	10.40	0.64	8.10	31.68	22030	Unadulterated.
.....	9.09	2.68	14.68	10.68	0.52	9.23	31.67	.....
.....			11.77	9.09	0.24	11.24		.....
Not registered, therefore sold illegally.								22031	Not registered.
.....	2.18	0.89	3.07	2.18	0.36	6.90	28.44	.....
Not registered, therefore sold illegally.								22032	
.....	16.57	13.37	29.94	16.57	3.50	35.49	"
.....	13.57	6.07	24.28	13.57	5.5	28.13	17836	Genuine.
.....			19.64		.....	7.19		..
.....			21.82		.....			..
5.00	3.00	2.00	10.00	8.00	3.00	17.99	17837	"
5.76	3.35	1.92	11.03	9.11	3.46	13.85	19.48	.....
4.46	3.92	2.53	10.91	8.38	2.99	14.03	19.20	.....
.....	11.00	9.00	2.00	17838	"
5.25	1.41	4.60	11.26	6.66	2.12	9.60	16.02	.....
4.48	4.00	2.24	10.72	8.48	2.68	15.83	17.82	.....
.....	9.20	2.14	17839	"
5.11	2.92	3.00	11.03	8.03	2.97	9.85	17.90	...	
1.91	3.38	4.03	9.32	5.29	2.34	7.42	12.97	...	
Not registered, therefore sold illegally.								17840	Not registered.
.....	
3.88	3.38	2.06	9.32	7.26	2.96	11.37	14.61	...	
Not registered, therefore sold illegally.								17841	"
.....	
4.17	2.98	1.30	8.45	7.15	2.07	7.82	14.27	.....
Not registered, therefore sold illegally.								17842	"
.....	
4.90	3.10	2.68	10.68	8.00	2.07	14.85	14.96	.....
6.00	2.00	2.00	10.00	8.00	2.00	14.67	17843	Genuine.
5.11	3.85	2.23	11.19	8.96	2.53	13.90	16.32	
5.59	1.65	4.41	11.65	7.24	1.95	9.16	14.85	

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TABLE II.—Results of the Examination of 85

		NAME AND ADDRESS OF			Nitrogen.		
Date of Collection	No. of Sample.	Vendor.	Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Total; including that of Nitric Acid or Ammonia if present.	Total; calculated as Ammonia.	
1902.		Victoria, B.C.	Analyst, Dr. J. C. Fagan, Victoria, B.C.		p. c.	p. c.	
April	1	21668	Victoria Chemical Co.	Vendors.....	Mixed Fertilizer 'A'— Guaranteed Standard sample Sample as sold	4·00 3·99 3·82	..... 4·84 4·65
"	1	21669	"	"	Mixed Fertilizer 'B'— Guaranteed Standard sample Sample as sold	3·50 3·85 2·90	..... 4·68 3·50
"	1	21670	"	"	Mixed Fertilizer 'C'— Guaranteed Standard sample Sample as sold .....	..... 0·77 0·56	..... 0·93 0·68
"	1	21671	"	"	'Superphosphate'— Guaranteed Standard sample Sample as sold .....	..... 0·89 0·75	..... 1·08 0·91
"	1	21672	W. A. Jackson & Co., Druggists. Vancouver, B.C.	"	'Liquid Fertilizers for Plants' Guaranteed Standard sample .. Sample as sold .....	..... ..... 2·47	..... ..... 2·99
"	3	21673	M. J. Henry.....	Pacific Meat Co., Tacoma, U.S.A.	'Bone Meal'— Guaranteed Standard sample Sample as sold .....	..... ..... 4·20	..... ..... 5·10
"	3	21674	"	Hy. Cowell, Tacoma, U.S.A., imported from Germany.	'Muriate of Potash'— Guaranteed Standard sample Sample as sold .....	...............	...............
"	3	21675	"	Victoria Chemical Co., imported from Chili.	'Nitrate of Soda'— Guaranteed Standard sample Sample as sold	16·00 15·62 15·40 18·97 18·69

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Samples of Fertilizers, as sold in 1902—*Concluded.*

RESULTS OF ANALYSES.								No. of Sample	District Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs		
Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
			10.00		7.00			21668	Genuine.
11.20		0.45	11.65	11.20	6.87	9.20	32.41		
9.80	0.84	1.05	11.69	10.64	7.20	14.15	29.73		
			9.00		11.00			21669	"
9.40	0.89	Trace.	10.29	10.29	11.90	9.10	35.79		
8.90	0.70	0.49	10.09	9.60	10.90	12.19	30.01		
			12.50		11.00			21670	"
12.47	0.96	Trace.	13.43	13.43	11.16	11.80	29.77		
11.90	0.84	0.56	13.30	12.74	11.00	15.21	28.77		
			16.00					21671	"
14.20	0.60	0.45	15.25	14.80		10.55	20.43		
17.24	0.70	0.56	18.50	17.94		12.14	23.43		
Not registered.								21672 Not guaranteed.	
3.65			3.65	3.65	19.88	1.14	31.18		
Not registered, therefore sold illegally.								21673	
	16.60	7.40	24.00	16.60		7.40	35.74		
Not registered, therefore sold illegally.								21674	
					56.85	2.13	59.69		
							41.60	21675	Genuine.
						1.25	40.61		
						1.90	40.04		

MEMORANDA ON MANURES.

Since this publication is intended for circulation among our farmers, it has been thought advisable to take advantage of its issue by reprinting some of the notes which have appeared in former bulletins, and adding a few additional particulars from works which have recently appeared, regarding the application of natural manures and artificial fertilizers.

It is nearly fifty years since Stoeckhardt, at that time professor in the agricultural school of Tharandt, Saxony, said that a farmer who bought guano, bonemeal, or other artificial fertilizers, and at the same time neglected to make proper use of the dung of the cattle on his own farm, must be regarded as an agricultural spendthrift. Every intelligent farmer in Canada will in these modern days agree with the old German professor, and maintain that the treasury of the farm is the dungstead, and that leaks and emanations from it of valuable fertilizing constituents must lead to financial embarrassment and possibly ruin.

This statement may be positively made without in the slightest degree detracting from the merits of artificial fertilizers, for when properly selected and applied, their value becomes abundantly evident. The question as to whether their use is remunerative has been frequently discussed, and depends to a large extent on the care employed in their selection. Supposing that the intelligent farmer has considered composition, cost, &c., to the best of his ability, made his selection and applied the fertilizer, he may still be in doubt as regards the result unless he takes steps to make a manure trial with it. As regards the best way of doing this, Hellriegel, in a publication, dated 1897, has related his experience. He recognizes how difficult it is for practical agriculturists, fully occupied with their regular work, and engaged in meeting all the difficulties caused by workmen, weather and market rates, to carry out regularly planned manure experiments. He therefore describes a method which experience in his estimation had justified, and recommends it for the purpose of ascertaining whether any application of lime, marl, dung or fertilizers had really produced the improvement which from the point of view of cost had been expected. This plan is to pass over, at one or several places, properly selected, a few square rods of the field without applying the dung or fertilizer. In this way unmanured plots, which do not require to be measured with great exactitude, but merely paced, and do not need to be harvested separately, are left in the manured field, by means of which any improvement in the latter may be remarked and valued.

This plan exacts that it should be possible to see a distinct difference between the unmanured plots and the manured field, not only as regards the height and density of the resulting crop, but also in reference to the fullness of the ears and the development of the grains. In the event of such a distinct difference being invisible the manure is justly discredited as unfit for its intended purpose. It would seem advisable to recommend this plan to farmers who use fertilizers, because some of them may manure the whole field, fail to see any improvement on account of being unable to make comparisons, and perhaps condemn the fertilizer unjustly. The simplicity of the plan above described, and its applicability everywhere and every year would appear to commend it to the practical agriculturist. At the same time it is necessary to remark that there are instances on record of fertilizers having been applied and remaining utterly without effect owing to some defect in the soil. Such defects have often been cured by a previous application of marl or lime, which not only produced good effects themselves, but improved also the action of the fertilizers afterwards applied.

THE CARE OF NITROGEN.

This element is the most valuable of fertilizing constituents, and one which is exceedingly liable to loss.

In many of the fertilizers described in this and former reports their cost is very much increased by the admixture of nitrogenous constituents. This cost farmers might save by properly caring for the stock of nitrogen on their farms and this stock might even be increased by cultivating those crops which have the power of appropriating the

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nitrogen of the atmosphere. Nevertheless, the fertilizer manufacturers still seem to be under the necessity of supplying this element in considerable quantity in their goods, and of charging for it. In the case of the mixed fertilizers, this extra charge varies from \$8 to \$14 per ton, which the farmer must pay if he purchases, and which he can readily save in his own stables, or produce upon his own farm.

Nearly the whole of the nitrogen in the fodder fed to farm stock is to be found in the excreta of the animals, and one half of it is contained in the urine. It is further well known that 95 per cent of the potash contained in the food of cattle and sheep may be recovered by carefully saving the liquid manure only. It has, however, been ascertained that stable yard manure experiences considerable loss of its fertilizing constituents, but more especially of nitrogen, when left to itself in the dung heap. According to the experiments of Wolff this loss amounts to 55 per cent of the nitrogen contained in fresh manure from horned cattle. The later experiments of Heiden and Holdefleiss place it at 23.4 per cent. These results were obtained when ordinary reasonable care is taken of the manure, but give no data for estimating the loss which occurs when, as is very frequently the case in Canada, the manure is treated with the grossest neglect. It is safe to assume that, generally, 50 per cent of the nitrogen contained in the barn-yard manure of this country returns unutilized to the atmosphere, or is otherwise lost by careless treatment. Supposing that an average quantity of 36,000 lbs. is produced in fresh condition annually by each animal, and that it contains 0.4 per cent of nitrogen, it follows that a loss of 72 pounds of nitrogen, worth \$8.64, takes place for each head of cattle. This loss can be prevented by daily strewing the stables with 2 lbs. of ground plaster for each animal, which at once prevents any smell of ammonia from arising in the stable. The quantity prescribed means 700 lbs. or a cost of about \$2.50 annually for each 1,000 lbs. live weight, but, by adopting this plan, the farmer would to a great extent be relieved from the necessity of purchasing the nitrogen of artificial fertilizers.

In a pamphlet published by Vieweg in 1859 entitled "Ein Pfund Stickstoff kaum einen Groschen," which may be freely translated "a pound of nitrogen for a penny," Dr. Meyer-Altenberg maintained that ground gypsum is the very best preservative of barn-yard manure when applied in the stable, because it secures "certainty and completeness of effect, ease of execution, and the lowest possible cost." He further described the effect of its application on the domain of Beberbeck in Hesse, and other impoverished farms, showing that it is possible to bring such into a fertile condition, without the purchase of manure or fertilizers or feeding stuffs, excepting a little straw for bedding and oats for the horses.

TREATMENT OF STABLE-YARD MANURE.

Dr. Meyer-Altenberg, in the little work above mentioned, takes care to point out that the use of gypsum, without subsequent careful treatment of the dungheaps, does not give the desired effect, and he dwells on the importance of having the manure thoroughly trodden down, and made as compact as possible. This is also shown in Dr. J. König's prize essay 'How can the farmer preserve and increase the stock of nitrogen on his property?' (Berlin, 1887.) In a special chapter of this work the author discusses 'The evolution of free nitrogen during the fermentation and storage of stable manure,' describes the experiments which were made from 1860 to 1885 regarding its treatment and gives finally the results of the discussion from which the following sentences may be translated with advantage:—

1. In the decomposition of nitrogenous substances of every nature a loss, more or less considerable, of free nitrogen takes place.

2. This loss is the greater the more the atmosphere has access to the decomposing mass.

3. Too much moisture is just as hurtful as too little. Stable manure requires such a degree of humidity as permits its components to lie close to each other.

4. The addition of substances which fix ammonia (such as gypsum, kainite and kieserite) prevent or reduce the loss of nitrogen. *These substances are, however, of little*

or no value if care is not taken at the same time to prevent as much as possible the access of air.

12. In storing stable manure in dungsteads the latter must be watertight and roofed in, and the treading down of their contents by the farm animals is to be recommended.

One thing in connection with this question is perfectly certain and that is that the use of gypsum, or ordinary ground land plaster, prevents any loss of nitrogen in the stable, and while the manure is being forwarded to the dungheap. Further, if the work from which the foregoing quotations have been made be carefully studied, and also the experiments and writings of Holdefleiss, Vogel and others, it appears to be quite certain that the use of the same article, or of the gypsum produced in the manufacture of 'acid-phosphate,' completely prevents the loss of ammonia from the liquid part of the manure, and also from the organic nitrogen of the solids, provided the whole has, previous to fermentation, been made thoroughly compact, and atmospheric air almost completely excluded. Where it is found impossible to attend to the latter precautions, the safest way will probably be found to lie in avoiding fermentation altogether, by conveying the fresh manure, after treatment with gypsum, on to the field to be manured and bringing it under the soil as rapidly as possible. The latter practice has been proved to be most advantageous by the experiments which have been carried on for some time past, at the Central Experimental Farm by Director Saunders. (See Reports for 1898.)

Not only has the addition of substances which have the faculty of fixing ammonia been recommended for stable manure, but its improvement to a greater extent has been proposed by the addition of fertilizers. The following quotation is taken from Bulletin No. 45 (for March, 1897) of the Massachusetts Agricultural College, and was written by Dr. C. A. Goessmann, Chemist for that institution :—

'The practice of adding to the manurial refuse materials of the farm as stable manure, vegetable compost, &c., such single commercial manurial substances as will enrich them in the direction desirable for any particular crop to be raised, does not yet receive that degree of general attention which it deserves' (The italics are in the original.) An addition of potash in the form of muriate or sulphate of potash, or of phosphoric acid in the form of fine ground South Carolina or Florida soft phosphate, &c., will in many instances not only improve their general fitness as complete manure, but quite frequently permit a material reduction in the amount of barn-yard manure ordinarily considered sufficient to secure satisfactory results.

'Average composition of seventy-five samples of barn-yard manure :—

	Per cent.	Lbs. per ton.
Moisture.....	67·00	1,340·0
Nitrogen.....	0·52	10·4
Potassium Oxide.....	0·56	11·2
Phosphoric Acid.....	0·39	7·8

The average barn-yard manure contains, it will be noticed from the above statement, a larger percentage of nitrogen, as compared with its potash and phosphoric acid than is generally considered economical. An addition of from thirty to forty pounds of muriate of potash, and of one hundred pounds of fine ground natural phosphate (soft Florida or South Carolina floats) per ton of barn-yard manure would greatly increase its value as an efficient and economical general fertilizer.'

These are no doubt most excellent suggestions, and there is no reason why these substances should not be introduced into the stable manure in the same manner as in the case of the ground plaster above mentioned. Plain superphosphate and kainite might also be used, some of the constituents in which would be useful in fixing the ammonia, as soon as formed from the organic nitrogen. Should this suggestion be found to have practical value, there is no doubt that our fertilizer manufacturers would be found able to supply our farmers, at a very moderate cost, with a mixture of ground plaster, superphosphate and kainite, in such proportions as experience might show to be most advantageous. No better application can be made of the wood ashes produced in

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the farmer's household than by mixing them with the barn-yard manure, and most excellent results are known to have followed this practice.

ACQUISITION OF NITROGEN.

Not only can the farmer save almost the whole of the nitrogen contained in the fodder fed to his cattle, but he can actually increase the stock of it stored away in his fields, agricultural products and manure heaps by a judicious course of crop rotation. For more than a century agricultural chemists discussed the question as to whether free atmospheric nitrogen can be assimilated by plants, but it may now be regarded as perfectly settled in the affirmative, if regard is had only to the plants of the order leguminosæ, such as beans, pease, lentils, vetches, clovers, alfalfa, serradella, &c. Even the great English agriculturists, Sir J. B. Lawes and Sir Henry Gilbert, who had previously been of an opposite opinion, have now admitted that this appropriation of nitrogen has been completely proved. This acknowledgment was made by Sir Henry Gilbert at a great meeting of agricultural chemists held at Halle, in Germany, in September, 1891. Thus, modern research has confirmed not only modern agricultural practice, but also the experience of antiquity, for Prof. W. Strecker has pointed out a passage in Pliny which says: 'Lupines require so little manure that they in fact replace it; vetches make the land more fertile. Corn should be sown where previously lupines or vetches have stood, because they enrich the land.'

It is not, however, to be supposed that this utilization of atmospheric nitrogen by leguminous plants can take place upon very poor soils or upon those destitute of the inorganic constituents which they require. The latter must in such cases be supplied in the shape of potash with some phosphoric acid, as was done with great success by Schultz, of Lupitz, a practical agriculturist in North Germany. In fact, had it not been for his investigations, the controversy above referred to might have continued without results up to the present hour.

Professor König, of Münster, gives the following summary of Schultz's experience:—

'Schultz acquired the farm Lupitz in the year 1855; its soil consisted of a poor, cold, diluvial sand; the profit in working it was very small. Lupines yielded indeed as fodder tolerable results, but when used as green manuring for rye and oats, no return was obtained from them. The application of artificial manures produced good crops, but they did not pay; burnt lime showed itself to be too heating. The use of manure was more favourable, especially when fertilizers containing phosphoric acid were used at the same time. But at the best the total result was not satisfactory.'

'Shortly after Schultz acquired Lupitz, the great discovery of potash salts was made, and about 1860 they began to be produced from the mines of Stassfurth. Schultz made up his mind to try them as manure and he obtained the most surprising results. After lupines had shown themselves to be useless as forerunners of grain, they were excluded from the rotation and grown on a separate field without any manuring and alternating with sheep pasture. But the harvest on these became worse and worse until the field in question became quite lupine 'sick.' Schultz made his first trial on this field, manuring it with 300 pounds kainite per morgen (1 Prussian morgen = 0.631 acre); the sickness was at once cured, and for twenty-five years afterwards Schultz has grown lupines on this ground without interruption, always with the application of 300 pounds kainite. Schultz obtained similar good results on the ground which had received the marl, by the application of potash salts. This ground had indeed yielded well with lupines for two years after the application of the marl, but in the third year they sickened here too. When, however, 300 pounds kainite were applied here and ploughed in, the ground was cured, although an application of phosphates had not produced the desired results.

'The favourable influence which the manuring with kainite or potash salts had exerted on lupines induced Schultz to try them on grain, in conjunction with phosphates. But in this case he obtained contradictory results according to the nature of the crops which preceded the grain. For instance, while grain sowed after lupines and manured with potash and phosphates yielded very good and remunerative harvests, these were not

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to be obtained if grain was grown after grain or after potatoes. This behaviour of these crops was explained by Schultz in this way: that lupines or deep-rooted plants leave in the soil after harvest a residue of root, in which a considerable amount of nitrogen has accumulated, an amount sufficient to supply the wants of the following grain crops; that, on the other hand, the application of potash and phosphates to grain, after a preceding grain crop, is without effect, for the reason that the latter has consumed the stock of nitrogen. Grain crops always reduce this stock; never increase it. Schultz has given the name 'nitrogen collectors' to the lupines and similar plants, while grains are called 'nitrogen consumers.' His system of rotation is therefore the following:—Sow first nitrogen collectors (lupines, pease, beans, vetches, clover, lucerne, serradella, &c.), or, as they have been called, renovating crops, and give them 300 pounds kainite per morgen, with perhaps an addition 20 pounds phosphoric acid. After harvesting the nitrogen collectors, sow a nitrogen consumer, raising a grain or exhausting crop, giving it also 300 pounds kainite and 20 pounds phosphoric acid. The grain crop is perfectly successful, because the first crop left behind it nitrogen enough to supply the wants of the grain. In this way the keeping of stock, which is expensive on a poor sandy soil, can be reduced and the purchase of nitrogenous fertilizers dispensed with, because the nitrogen collectors are able to stock the soil with that valuable element'.

The foregoing description is taken from Professor König's "*Stickstoff Vorrath*," published in 1887 (Paul Parey, Berlin). It was in 1884, nearly thirty years after the purchase of his sandy farm, that Schultz, of Lupitz, published the results of his experience, although they did not contain anything very new and although they only confirmed experiences still older than his own. But his case was surprising and his explanation of the cause of his successful farming challenged the attention of scientific agriculturists. The consequence has been the issue of many pamphlets on the subject, and an activity in the region of agricultural experimenting which is not yet ended. Atwater, Wagner, Heiden, Hellriegel, and many others have participated in these investigations, and Professor Wood, of the Storrs Agricultural School in Connecticut, has given the following general conclusions as the result of the work:—

1. "Pease, alfalfa, serradella, lupine, clover in all probability, and apparently leguminous plants in general, are able to acquire large quantities of nitrogen from the air during their period of growth.

2. "There is scarcely room to doubt that the free nitrogen of the air is thus acquired by plants.

3. "That there is a connection between root tubercles and this acquisition of nitrogen is clearly demonstrated. What this connection is, what are the relations of micro-organisms to the root tubercles and the acquisition of nitrogen, and in general how the nitrogen is obtained are questions still to be solved.

4. "The cereals with which experiments have been completed have not manifested this power of acquiring nitrogen, nor do they have such tubercles as are found on the roots of legumes.

5. "In the experiments here reported, the addition of soil infusions did not seem necessary for the production of root tubercles. A plausible supposition is that the micro-organism or their spores were floating in the air and were deposited in the pots in which the plants grew.

6. "As a rule the greater the abundance of root tubercles in these experiments, the larger and more vigorous were the plants and the greater was the gain of nitrogen from the air.

7. "In a number of these experiments, as in similar ones previously reported, there was a loss of nitrogen instead of gain. The loss occurred where there were no root tubercles; it was especially large with oat plants, the largest where they had the most nitrogen at their disposal in the form of nitrates. As the gain of nitrogen by the legumes helps explain why they act as renovating crops, the loss in the case of the oats suggests a possible reason why they should appear to be an exhausting crop.

'Practical inferences:—The ability of legumes to gather nitrogen from the air helps to explain the usefulness of clover, alfalfa, pease, beans, vetches and cow pease as renovating crops, and enforces the importance of these crops to restore fertility to ex-

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hausted soils. The judicious use of mineral fertilizers (containing phosphoric acid, potash and lime) will enable the farmer to grow crops of legumes which, after being fed to his stock, will, with proper care to collect and preserve all manure, both liquid and solid, enable him to return a complete fertilizer in the shape of a barn-yard manure to his land. A further advantage of growing these crops is that the nitrogenous material, protein, which they contain in such great abundance, is especially valuable for fodder'.

From the foregoing it seems that, in the present condition of our knowledge, the conclusion may be drawn that the atmosphere stands ready to furnish the farmer, gratis, with all the organic constituents which his crops require, provided always that he, on his part, will exercise a sufficient amount of skill and intelligence in appropriating and retaining on his farm the fertilizing materials, and especially the nitrogen. If he does this, all that is necessary for him to provide, in order to replace the losses which his farm sustains from the sale of stock or produce, are the inorganic or mineral constituents of these, and especially the phosphoric acid and potash. There is much in all this to remind one of Sprengel and Liebig's teaching of fifty years ago, according to which a plant cannot thrive if its soil does not contain all the substances which are to be found in its ash.

UTILIZATION OF SEWAGE.

The losses in fertilizing material which are sustained, as above mentioned, on account of the neglect or unscientific treatment of barn-yard manure, are very trifling when compared with those which the community suffers in the almost total loss of the nitrogen, phosphoric acid and potash contained in human excreta. The utilization of such always becomes a subject for discussion when the question is raised as to how a cheaper class of manures than the artificial fertilizers can be obtained for use in agriculture.

Where the water carriage system of removing sewage and excrement has been introduced, nothing is to be hoped for in the recovery of their fertilizing constituents. Even in cases where, at large expense, establishments have been erected for the treatment of sewage by precipitation or similar methods, the products have been found to be entirely destitute of agricultural value. The greater part of the fertilizing constituents of sewage are in such a soluble condition, and have been diluted with water to such an extent, as to render their recovery economically impossible. It has been attempted in the neighbourhood of many cities in England and on the continent of Europe to use the sewage for irrigation and as liquid manure, but this method of utilization has been found to be in the highest degree imperfect. At Berlin it has been proved, that of the nitrogen contained in its sewage, at the very most only 13·8 per cent is found in the agricultural products of all the magnificent farms irrigated by it in the neighbourhood of the city. When the use of water for removing house refuse is excluded, and ordure and urine are removed as manure in their natural state, their utilization is possible, and is made a source of revenue in such towns as Stuttgart, Groningen, Greifswald, &c. But the systems of this class which are in use have all their disadvantages, as is proved by the tendency which municipal authorities constantly show to adopt the water carriage system. The greatest disadvantage under which these systems labour is the difficulty caused by the offensiveness to sight and smell of the material with which they have to deal. This has been entirely met by the use of moss litter as an absorbent, deodorizer, and disinfectant.

MOSS MANURE.

The first public mention of the usefulness of moss litter as a deodorizer and absorbent seems to have been made by Dr. Ludwig Happe, in Braunschweig, in December, 1880, since which time its application for the purpose has gradually increased until now, when the system has been introduced into several towns in Germany, and is also practised in Congleton, Cheshire, England. In Canada this method of deodorizing human refuse has been in use for years at Caledonia Springs. It, of course, at once

recalls the dry earth system regarding which great expectations were at one time entertained. The advantages of moss litter over dry earth for the purposes in question are, however, very decided. They consist in the perfect inoffensiveness of the moss litter product, in the fact that one part of moss litter will deodorize and dry at least six parts of mixed excreta, and in the greater agricultural value of the resulting manure. Dry earth (which is required in quantity at least equal to that of the excreta) is valueless from an agricultural point of view, but this is not the case with moss litter, which as its analyses show, often contains as much nitrogen as ordinary barn-yard manure. Numerous analyses have been made of moss litter manure as produced in Germany, and its average contents from seven different towns may here be stated.

	p. cent.	lbs. per ton.		Value per ton.
Nitrogen.....	0·664	13·28	at 13c.	\$1 72
Phosphoric acid.....	0·350	7·00	5	0 35
Potash.....	0·285	5·70	5¼	0 30
Water.....	83·00			\$2 37

Numerous trials have been made on various crops with this manure, and very satisfactory results are always reported. In all cases it is stated to excel barn-yard manure even when the latter is used in much greater quantity.

Canada possesses in its bogs and swamps inexhaustible quantities of moss litter, which is frequently found in beds, several feet in thickness lying above the peat. The following tests have been made in the Inland Revenue Laboratory, of moss litter from various localities in the Dominion :—

	Moisture.	Ash.	Nitrogen.
	p. c.	p. c.	p. c.
Moss litter, Berwick, N.S.	14·40	1·16	1·26
Black muck, Berwick, N.S.....	13·30	3·68	1·58
Moss from Great Village, N.S.	63·44	3·46	0·63
Sphagnum moss from Shippegan, N.S.....	12·45	1·55	0·55
Light coloured moss litter from Lincoln Parish, N.B.....	11·55	1·40	1·79
Dark coloured sample from the foregoing locality	10·95	0·80	1·06
Moss litter from Musquash, N.B.....	11·50	0·95	0·82
Moss litter from lower layer	12·50	0·90	0·72
Peat from St. Bridget, P.Q.	13·30	2·50	1·48
Peat from St. Hubert, P.Q.....	12·35	2·68	1·84
Light coloured moss litter from Caledonia Springs, Ont.	10·00	1·60	2·95
Dark coloured moss litter from the same locality.....	11·60	2·70	2·23
Peat from the same locality	10·95	3·90	2·94
Surface moss from the Mer Bleu at Eastman's.....	10·85	2·80	0·71
Surface moss from the Mer Bleu at Baldwin's Farm.....	7·90	2·66	1·47
Surface moss from the Mer Bleu at Baldwin's Farm 18 inches deep	27·90	1·72	1·64
Peat from Mer Bleu at McFadden's Farm, Navan, wide ditch....	22·60	4·40	2·21
Peat from Mer Bleu at McFadden's Farm, Navan, narrow ditch..	9·40	6·62	2·80
Peat from near Stratford, Ont.	16·80	9·10	1·91
Hypnum moss from the Ellice bog, Stratford, Ont.	8·75	9·72	2·01
Moss litter from Welland marsh, Ont.....	3·85	4·70	1·51
Peat lying underneath the foregoing.....	5·30	4·85	1·41
Peat from same locality, 4½ feet deep	3·25	41·25	1·52
Peat from Dobson's bog near Beaverton, Ont.....	18·42	9·04	1·89

The manufacture of moss litter has been attempted at Musquash, in New Brunswick, and also in Welland County, Ontario. From the latter locality I was supplied with several bales of the moss litter for experimental purposes, and Dr. Laberge, of Montreal, undertook to superintend the carrying out of an experiment to determine its deodorizing and absorbent qualities. He reported that 100 pounds of moss litter were

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sufficient for drying 800 pounds of ordinary excreta from privy pits in Montreal, and rendering it entirely inoffensive. A sample of the product remained for days in my office without attracting notice, and indeed it was quite devoid of odour. Its analysis gave the following results:—

	Per cent.	Pounds per ton.		Value per ton.
Nitrogen.....	1·31	26·2	at 13c.	\$3 41
Phosphoric acid.....	0·90	18·0	at 5	0 90
Potash.....	0·14	2·8	at 5¼	1 15
Water.....	65·47			\$4 46

The valuation of ordinary fresh barn-yard manure with 75 per cent of water is about \$2 per ton; with 67 per cent water, as in the case of the average given above by Dr. Goessmann, the value is nearly \$2.25. Therefore, much better results might be expected agriculturally from a 'moss manure' of the composition just described.

These facts are reported in order to show that Canada possesses in her waste lands abundance of material which might be used in our towns and villages for the production of a very valuable manure, with the simultaneous introduction of very many sanitary advantages. It is not to be expected that cities or towns which are advantageously situated for the water carriage system, or which have already adopted it, will make any changes, but there are many towns and villages in the Dominion where the application of the moss litter system would be very suitable, and the authorities of which, by selling the product or giving it gratis to the farmers of the neighbourhood, might confer a great advantage on agriculture.

